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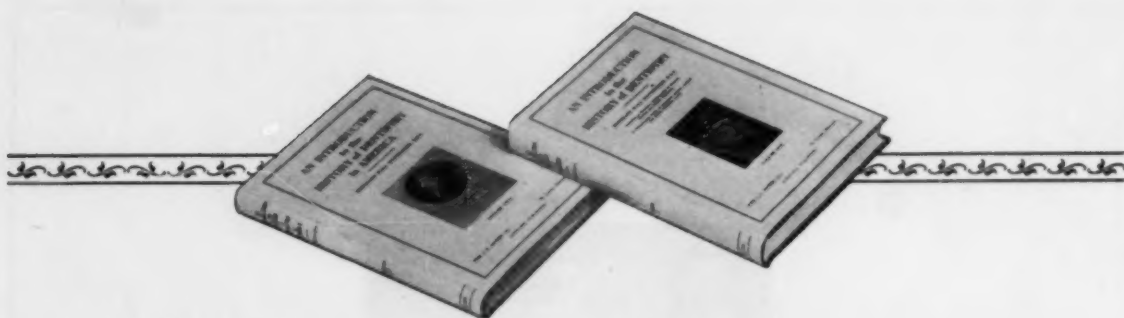
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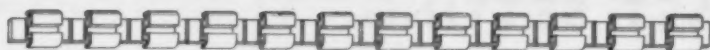
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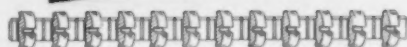
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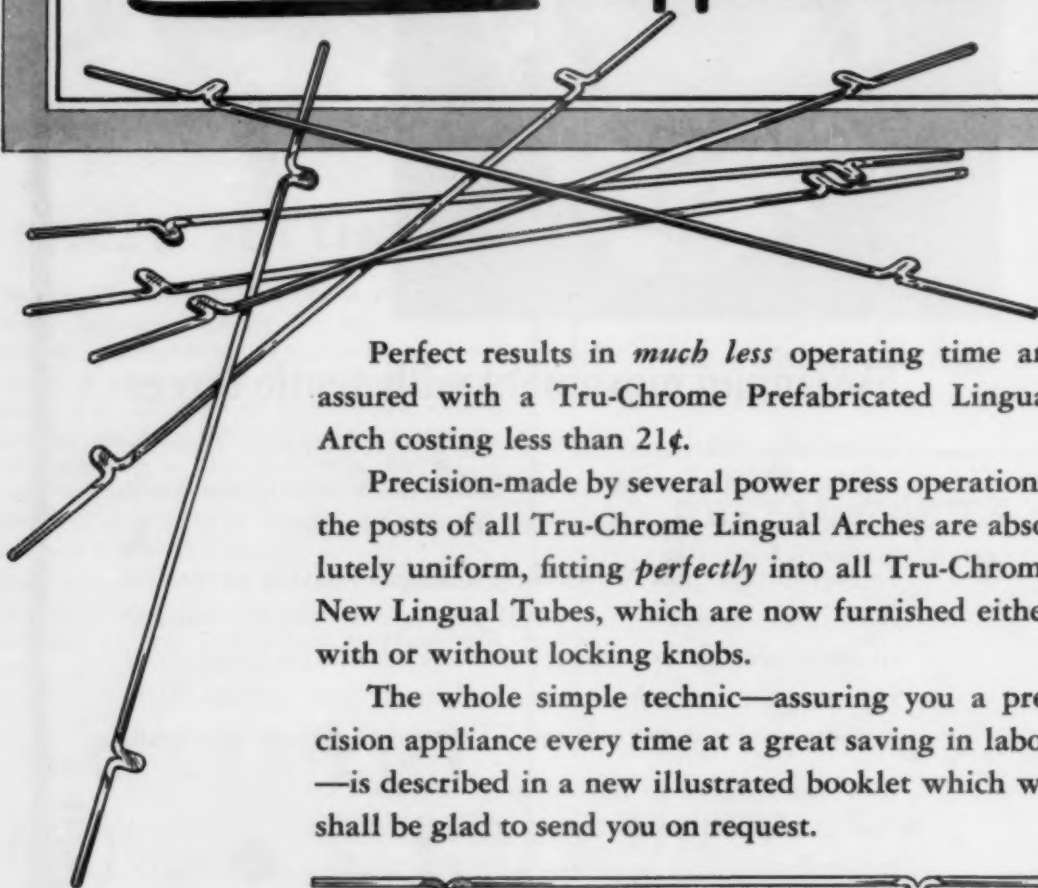
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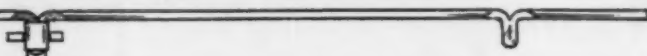
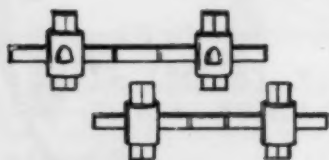
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Original Articles

THE ROLE OF OBSERVATION AND SIMPLE TREATMENT IN THE PRACTICE OF ORTHODONTICS

HARLOW LOUIS SHEHAN, D.D.S., JACKSON, MICH.

IT WOULD be a limitless task to enumerate the people who have devoted their intellectual ability and their working energy to the general problem of simplicity and control. In a very real sense, the progress that is made toward the solution of this problem is the history of civilization. The great in religion, in philosophy, in science, and in invention are those who have simplified and who have given understanding. The skilled use of this understanding has made the impossible of yesterday the easy of today, and will make the difficult of today the simple of tomorrow. Christ, our Saviour, was also our greatest Simplifier; He dispensed with countless gods, spirits, devils, and images, and gave us a few simple precepts which enable us to live as human beings and not as beasts. Plato, Aristotle, and Aquinas, Locke, Jefferson, and Whitehead have helped us to dispense with incomprehensible rationalizations and have aided us in the attainment of simple and orderly thinking. Archimedes and Gallileo, Mendel and Darwin, and Newton and Einstein are but a few among the many who have provided the simple and necessary principles of science. The wheel, the lever, and the keystone arch, simple inventions, but without them civilization as we know it would not exist.

The development of orthodontics, as a profession and as a science, has not had a different history than the development of civilization in general. As orthodontics emerges from obscurity, we note a diverse and complicated gadgetry come into existence for the treatment of malocclusions. We also note a proliferative development of ideas and rationalizations—apparently plausible, but certainly incomprehensible statements—for the explanation of malocclusions. Orthodontics became recognized as a profession and as a science largely through the work of Edward H. Angle. Among the many contributions of Angle are

This thesis was submitted to the American Board of Orthodontics in partial fulfillment of the author's requirements for certification.

three basic ideas which are remarkable in their simplicity when viewed in the time (context) in which they appeared. They are:

1. The development of the edgewise appliance system with the use of gentle forces for the treatment of malocclusions. The construction and use of the appliance requires skill; this is as it should be. The principles, which the use of the appliance subserve, are simple and easy to comprehend. This basic invention set the stage and provided the plot that unified orthodontics and enabled other workers to progress further in the simplification of appliances and to attain greater and more precise skill in the treatment of malocclusion.

2. The provision of a classification system for occlusion that permitted orthodontists to order their observations in a systematic way so they could comprehend each other in discussion and collectively pool and consider their clinical and research experiences. This simple step not only permitted but also forced professionals to think together and to review their differences of practice and of opinion in a comprehensible fashion. In a sense, the invention of the edgewise appliance made orthodontics a skilled trade and the provision of a secure foundation for thinking and discussion made orthodontics a profession and a science. *With neither, orthodontics would still be in the Dark Ages!*

3. The third simple and progressive proposition that Angle contributed to the development of orthodontics was the recognition that Nature had a plan about occlusion and that fundamentally the business of the orthodontist was to aid and abet Nature in doing her job well to produce normal occlusion. *Angle properly placed the orthodontist relevant to the task he had to perform!* Discovery of Nature's plan or intent is the central thesis of modern biology. This is not the place to write the history of the discoveries nor to list the discoverers; it is the place to emphasize that the great discoverers about Nature's plan have always been the great observers. La Marek observed and recognized the adaptation of organisms to the environment in which they lived and added immeasurably to the status of biology as a science. Mendel observed peas, recognized heredity, and the science of genetics was born. Darwin observed the competition of living species against each other and in their environments in the struggle for existence, and the concepts of evolution, natural selection, and the organism as a whole were written into the knowledge and understanding of biology. These illustrations serve (unequivocally) to place observations as a necessary adjunct to progress. Angle told orthodontists what their business was, *observation must tell the orthodontist how to perform it!*

It is the obligation of the clinician to practice well and to extend his services as far as possible. In order to do this he must be guided by principles that are sound and constructive in the guidance they give growing clinical experience. Two of the principles that have been meaningful to me are simplicity and careful observation as prerequisites to successful treatment so that, as Hughes¹ stated:

Thought and reason should be applied accurately and continuously to an ever-increasing body of carefully collected facts so that *the relevancy of opinion to fact will consistently be maintained.*

Hughes continued rather forcefully:

In very plain words so you may not misunderstand me, I hold the opinion—attained through reading of orthodontic literature and through conversations with orthodontists—that too much attention is paid to “basic principles, concepts, and opinions, and too little to refined and critical observation of the facts contained within an individual upon which, finally, *the treatment of any case must depend!*”

It would be unwarranted egoism to assume or to indicate that the profession of orthodontics and many eminent clinicians within the field have not given serious attention to simplicity and observation in the management of cases in practice. The tenor of the profession as a whole is toward rather than away from these items. A few references to the literature serve to illustrate.

Frank S. Cartwright,² in his presidential address before the Great Lakes Society of Orthodontists in November, 1941, developed the following discussion:

About twenty-five years ago, the orthodontic profession stopped its too serious consideration of appliances as a means to successful treatment, and began to think in biologic terms. Then for a number of years cumbersome, unsightly, complicated appliances were discarded, and in their place simplified bands and wires were substituted. For some unknown reason during the past few years there has been an unfortunate return to complicated appliances, appliances costly in material and costly in constructive and operative time. While many of these “contraptions” may impress the lay people with our mechanical skill, we ought to remember that as in art, and in all things, our supreme principle should be simplicity.

Ira Lehman³ holds the same point of view and illustrated his discussion by presenting five case reports. He said:

A period of intelligent observation before making a final diagnosis and placing mechanical appliances might prove to be an important factor in reducing the number of cases treated and the time required in the treatment of others. Some men in orthodontics feel that more thought should be given to the simplifying of treatment in many cases, thereby extending the advantages of orthodontics to a greater number of patients. In so doing, they must consider much more carefully and thoroughly diagnosis, when to treat, and how to treat a case.

Lehman presented five cases under his observation and concluded:

Observation as an aid in diagnosis has proved to some men that the amount of orthodontic treatment that seems necessary at the first examination can often be reduced or entirely eliminated.

Although the writer is not in complete agreement with all of the points brought out by John V. Mershon⁴ in his article, “Orthodontic Facts Versus Fallacies,” three statements provide illustration of the ideas under discussion:

1. I believe that the simplest appliances, used for the shortest possible periods of time, constitute the best orthodontic treatment.
2. If I were to coin a phrase which would describe the basis of wrong orthodontic practice, I would say “too much and too soon.”
3. That which distinguishes a profession from a trade is the dominance of mental effort over manual effort.

Charles M. Waldo⁵ made this statement which exemplifies the ever-present need for observation, “Decisions regarding treatment should rest on the requirements of the individual case and not on the preference of the orthodontist.”

George R. Moore⁶ continued the emphasis with slightly different statement:

Timing is different for different types of dentofacial deformities. . . . It is regrettable that in a great many cases, regardless of type, the orthodontist does not have the opportunity to treat the patient at the most desirable time and does not often have the opportunity to observe patients for months and years before the optimal time for actual treatment.

The importance of observation and simplicity does not need to be labored further by added citation. The attainment of simplicity in practice is another matter. Here the clinician must conjoin the knowledge of the science of orthodontics with accurate observation of the facts of the individual case in order to produce a maximum treatment with a minimum effort and discomfort to the patient, or to avoid treatment entirely if it turns out to be unnecessary.

The task of keeping abreast of knowledge is strenuous in itself and it is not the purpose of the present essay to review, to summarize, and to present the knowledge of orthodontics. Rather it is the purpose to re-emphasize that the patient who receives treatment or advice from the orthodontist invests both in his knowledge and in his skill; the two are inseparably linked and if one or the other is deficient the orthodontist becomes a poor investment risk.

It is impossible to consider treatment without giving serious thought to the knowledge contained in the simple phrase, physiologic tooth movement. Albin Oppenheim⁷ contributed much. His excellent statement follows:

Nature should be given enough opportunity and time to perform what we intend to do by the application of stimuli, not forces. Stimuli alone create the osteoclasts, which remove the obstacles to tooth movement. They, not the appliances, are responsible for our results. Appliances are only a means to create osteoclasts by stimulation.

Knowledge of growth is necessary for the clinician who uses timing and pacing as part of his treatment planning. Decision regarding when to treat and the rate and amount at which treatment should continue requires an understanding of growth in general and of the patient in particular. The former is provided by the literature and here one must recognize the important work of Todd, Hellman, Broadbent, and Brodie, in addition to many others who have contributed to this area. Advances in the knowledge of tissue behavior involved in the growth of bones and teeth become especially useful in considering timing and pacing. The work of Oppenheim has been mentioned; the work of Weinmann and Sicher and Schour and Massler surely should be added. Finally, the essay on timing and pacing presented by Dr. W. Wayne White at the 1948 meeting of the American Association of Orthodontists gives further evidence of the present importance of the subject. Certainly treatment that is inappropriately timed and poorly paced is complex, and (conversely) the keynote to simplicity is precision in timing and pacing.

Knowledge of heredity gives the clinician a more reasonable expectation about the organism and access to a better decision regarding the extent to which the proposed treatment will strain the biology of the patient. Treatment becomes complex when one attempts to force, and becomes simple when one works with the organism. The work of Hughes, Moore, and Johnson merits recognition in the field of heredity as it bears on the etiology, diagnosis, and treatment of

malocclusion. Moore and Hughes⁸ presented the case in a reasonable fashion:

Two points have been brought out in the analysis which warrant further consideration from the standpoint of the bearing they have on diagnosis and treatment. The first of these is the extensive operation of heredity in the production of features in the dentofacial complex. If we assume—and we seem obliged to do so—that an individual is developing along the lines of his biologic expectation when he gives full expression to the hereditary circumstances that are initially responsible for him, we must recognize that many undesirable traits biologically are fully normal. We can no longer retain the point of view, “Nature never makes a mistake,” with the subsequent assignment of all irregularities and anomalies to nurlural, developmental, or mechanical interferences with nature. And we must recognize that orthodontic procedure will be outlined on a policy of judicious interference with nature as frequently as it will be formulated on a basis of cooperation with nature.

The development of the concept of the individual normal, so well presented by Johnson, provides a very important directive to the practicing orthodontist. It helps to take him out of appliances and away from occlusal classification; above all it forces the orthodontist to observe the patient and to take cognizance of his heredity and growth and his biologic assets and liabilities before a decision regarding the individual normal can be made.

The attainment of simplicity in appliances has received too much attention from the profession as a whole to merit further elaboration here. Surely no sensible orthodontist would underestimate the importance of appliance simplicity.

The useful knowledge provided by the fields of child development and psychology are especially suggestive to the practitioner who is interested in simple treatment. Adequate psychologic management of the patient gives the clinician access to the tremendous power of cooperation and understanding. If treatment is to be simplified the patient and the orthodontist must cooperate. Dr. Mershon once said that years of clinical experience should teach a man something—in this I agree. My clinical experience has taught me that a cooperative patient is a set of appliances in himself.

Kurt Goldstein,⁹ one of the most provocative thinkers in modern biology, presented three statements which are offered in conclusion to the essay part of this presentation. They are:

1. The decision as to whether a certain pattern of behavior of an organism is simple or complex, presupposes a knowledge of the “nature” of the creature involved. Only on this basis can we understand whether or not those traits are characteristic of this being.

2. In order to decide whether a performance of a given organism is simple or complex, it is necessary to know what demands that performance makes upon the capacity of that organism.

3. Thus, the problem of simplicity and complexity leads us back to the problem of *unequivocal description of the very essence, the intrinsic nature of the particular organism.*

The next section of this paper presents, with brief discussion, eleven cases selected to illustrate the preceding essay.

CASE REPORTS

CASE 1.—The patient, a girl aged 10 years, 6 months, was referred by the family dentist who was concerned about $\frac{3}{-}$ being lingually locked to $\frac{3}{+}$. Since

the dentist was uncertain about the probable progress of this condition, the mother was referred for orthodontic appraisal and guidance.

The examination revealed Angle Class I malocclusion with anteroposterior tooth relationships normal throughout with the exception of $\overline{3}/$, which was not fully erupted, and was lingually locked to $\overline{3}/$. The development of the dentofacial complex was excellent throughout except for this detail (Fig. 1). The opinion was presented, and the reasons for it explained, that the patient should be placed on observation to see how Nature would handle the situation. This was done, and Fig. 2 shows the progress toward self-correction at the end of one year. At the end of two years the relation of $\overline{3}/$ and $\overline{3}/$ was normal (Fig. 3), and the patient was dismissed.

Fig. 1.



Fig. 2.



Fig. 3.



Discussion.—Although standard orthodontic practice would have permitted immediate active treatment, opinion to place the case on observation to see what would happen seemed warranted since immediate treatment was not necessary to the welfare of the patient nor required as a part of high-level professional practice. The provision of advice and guidance, when requested, is required.

CASE 2.—The patient was a girl aged 6 years. She was referred by the family dentist since the parents were concerned about mild crowding and the lingual relation of $\overline{1}/\overline{1}$ (Fig. 4).

The examination revealed the condition just described plus a too-long retention of $\overline{A/A}$; these were extracted and the patient was placed on observation. It was explained to the parents that tongue pressure would be adequate to move the $\overline{1/1}$ into normal alignment and that appliances would, for the present, be unnecessary.

The patient returned three months later showing $\overline{1/1}$ in normal position (Fig. 5). Observation was continued and the case was seen four months later at which time $\overline{2/2}$ were erupting in lingual position and $\overline{B/B}$ presented evidence of overlong retention (Fig. 6). These latter were removed and observation continued, still expecting the tongue to act favorably on $\overline{2/2}$ as it did on $\overline{1/1}$.

Three months later the better position of $\overline{2/2}$ is evident (Fig. 7). Since progress was excellent observation was continued.

Approximately one year later we note that the alignment of $\overline{21/12}$ is near normal and that $\overline{C/C}$ has been lost. Now $\overline{3/3}$ are beginning to erupt in lingual position (Fig. 8); $\overline{C/C}$ was removed; continued action of the tongue was expected; hence observation was continued. About three years later all lower anterior teeth had assumed normal position (Fig. 9).

Fig. 4.

Fig. 5.

Fig. 6.

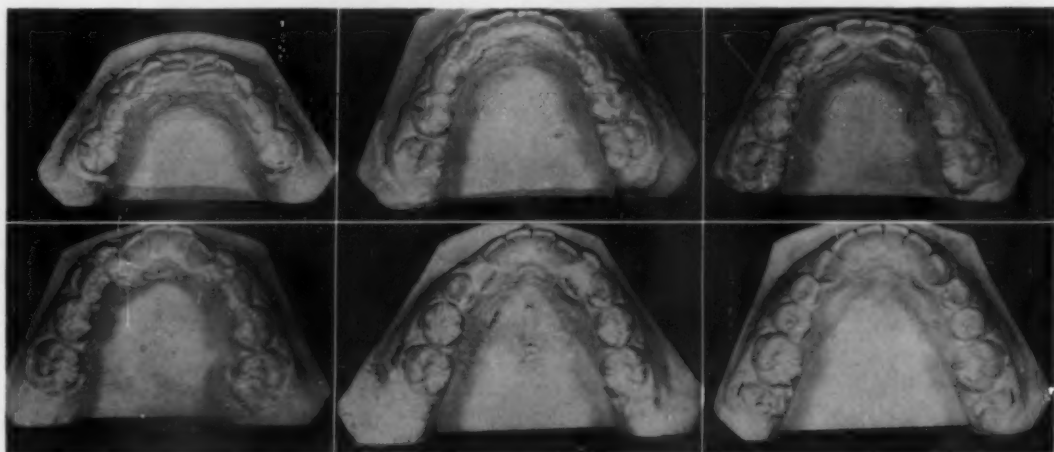


Fig. 7.

Fig. 8.

Fig. 9.

Discussion.—This is an example of the organism being completely able to perform a task that many orthodontists would assume it could not do without appliance intervention. Certainly observation was merited if for no other reason than to discover if Nature could do the job by herself. Important to all concerned is the fact that she did.

CASE 3.—The patient, a woman aged 34, came to the office because she was concerned about the position of $\overline{1/1}$, and especially worried because $\overline{1/1}$ were becoming so thin on the incisal edges that they were beginning to chip. This woman was referred by another patient who had been treated for a similar condition.

Fig. 10 shows $\overline{1/1}$ locked lingual to $\overline{21/1}$ with space between $\overline{23}$. Apparently $\overline{21/1}$ had been forced into labial position by the biting action of $\overline{1/1}$ which prevented $\overline{21/1}$ from assuming normal position. Observation showed that the patient could bite end-to-end. Therefore, it seemed reasonable that with

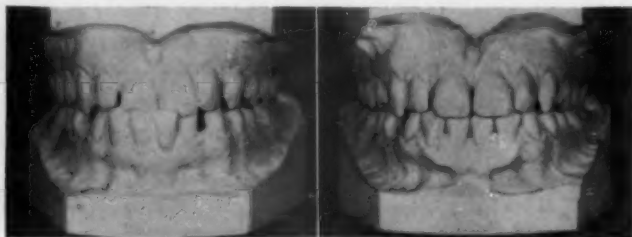


Fig. 10.

Fig. 11.

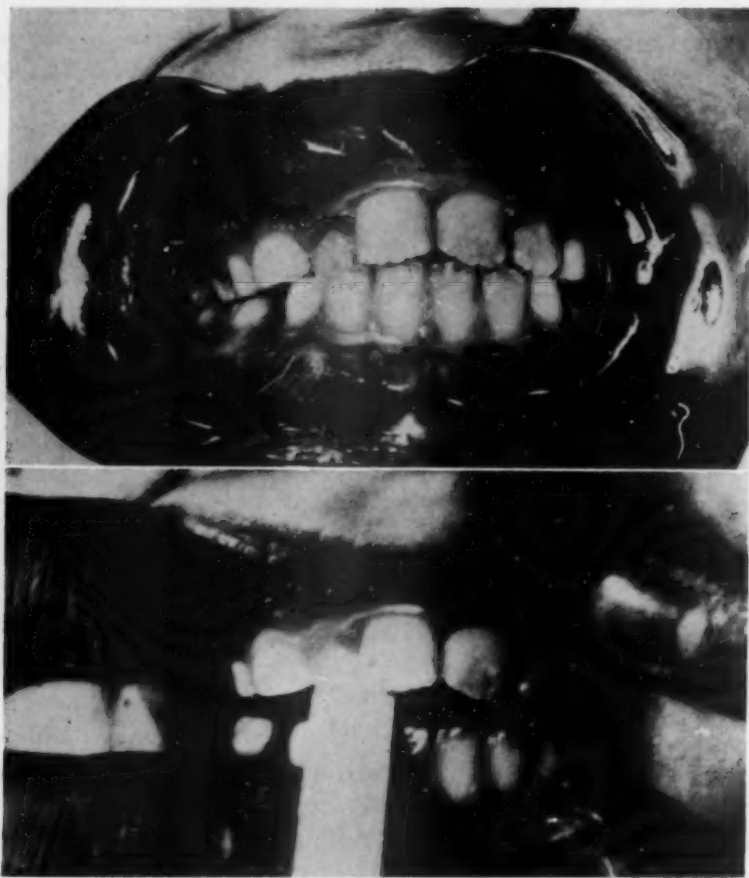


Fig. 12.

a small amount of outside help correction could be made. The simple wooden tongue blade appeared to have all the requirements necessary to provide this help.

Instruction was given as to proper use of the tongue blade. This is

illustrated in Fig. 12. The advice was simple, "Place the end of the blade behind the upper front teeth and in front of the lower front teeth, using the lower teeth as a fulcrum and keeping the tongue blade parallel to the long axis of the teeth (a demonstration of this was given) in order to avoid a depressing action on the lower teeth." The patient was then instructed to bite into the tongue blade and to pump the free end up and down for about seventy-five times three times a day, preferably in the morning, at noon, and at night.

This was done for two weeks. At the end of that time $\frac{1}{1}$ came into $\frac{1}{1}$ normal relationship and the space between $\frac{2}{3}$ was closed (Fig. 11).

Discussion.—This was a very simple treatment of a simple case, a very well-satisfied patient, and a powerful supporter of the orthodontic profession.

CASE 4.—The patient was a boy, aged 6 years, 6 months, who was referred by the family dentist. The main concern was the position of $\frac{1}{1}$. The examination showed $\frac{1}{1}$ to be locked lingual to $\frac{1}{1}$. The x-rays revealed the dentition to be present and normally developed for the age of the patient. The relations of $\frac{6}{6}$ plus the indications from $\frac{EDC/CDE}{EDC/CDE}$ indicated Angle Class III tendency (Fig. 13).



Fig. 13.



Fig. 14.

The patient could bite in end-to-end incisal relation, so the use of the tongue blade, as outlined in the discussion of Case 3, was advised. The cooperation of the 6-year-old was not as marked as that of the 34-year-old; consequently the aid of the mother was enlisted by explaining the importance of following directions if one were to expect the treatment to be successful.

The relations of $\frac{1}{1}$ were established as normal by the end of a three-
 $\frac{1}{1}$

week period. The treatment was discontinued and the case placed on observation. The conditions at the end of six months are shown in Fig. 14. Here we note that $\frac{2}{2}$ have erupted and are in fairly normal position. Not shown but evident is improvement in the Class III tendency.

Discussion.—It appeared advisable to establish the anterior teeth in normal relation at this early age in order to avoid further development of Class III tendency and to avoid the possible distortion in the anterior part

of the dentition. In other words, simple treatment seemed advisable in order to permit normal development.

CASE 5.—This patient was a boy, aged 18, who was referred by the family dentist. Both the boy and the dentist were concerned about the cross-bite in $\frac{21}{12}$. The examination showed typical Angle Class III malocclusion, type $\frac{321}{123}$

3, with spacing between $\frac{43}{34}$. End-to-end bite functionally was easy (Figs. 15 and 16).

It was decided that the use of a lower Hawley retainer was indicated. The appliance was constructed and fitted as shown in Figs. 17 and 18. The Hawley retainer was trimmed on the lingual leaving space between the teeth and the appliances from $\frac{3}{3}$ to $\frac{1}{3}$, and the loops were adjusted to close the spaces between $\frac{43}{34}$. The appliance was continuously worn and the patient was instructed to bite into the plane to encourage labial movement of $\frac{21}{12}$.

Fig. 15.

Fig. 16.

Fig. 17.

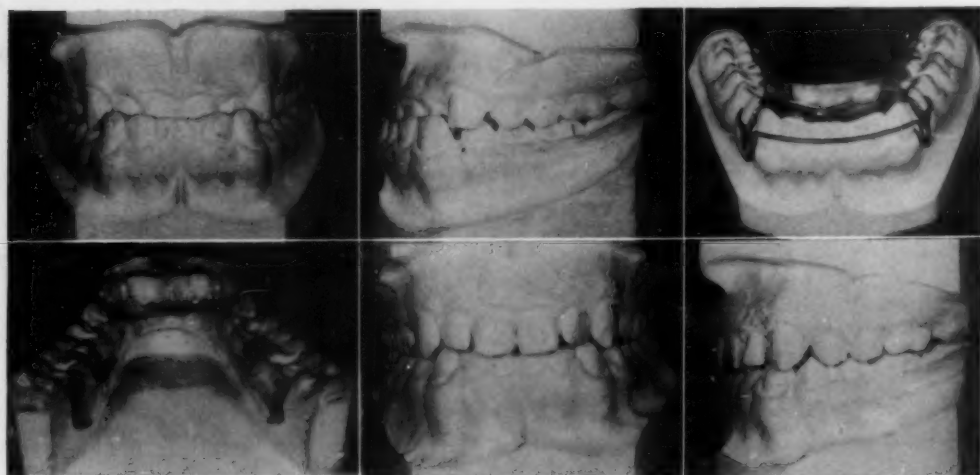


Fig. 18.

Fig. 19.

Fig. 20.

The treatment was active for a month, and the appearance at this time is illustrated in Figs. 19 and 20. Here we note the correction of the anterior cross-bite, closure of the spaces between $\frac{43}{34}$, and the change from Class III malocclusion to normal occlusion. The patient was observed for three years at yearly intervals with the correction apparently stable.

Discussion.—This is considered simple treatment by virtue of nonresort to comprehensive appliances for Class III malocclusion. Here the conditions appear to need appliances on the lower arch only. This is of considerable advantage to the patient.

CASE 6.—The family dentist of this girl, aged six years, 6 months, was worried about the development of the anterior teeth since $\frac{1}{1}$ were lingually locked to $\frac{1}{12}$. The examination showed the unerupted permanent dentition to be normal for the age of the girl; she had Angle Class III malocclusion with

the mesial displacement about one-third of a cusp. We also noted that $\overline{1/12}$ were in labial position due probably to the biting action of $\overline{1/1}$ (Figs. 21 and 22). The patient could bite in end-to-end relation with little effort, therefore, as in the previous case, it was felt that the bite could easily be jumped with a little assistance from a lower Hawley retainer.

This type of appliance was constructed as shown in Figs. 23 and 24. Since $\overline{1/12}$ had been pushed slightly to the labial surface by the biting action of $\overline{1/1}$, the Hawley retainer was trimmed a little on the lingual surface; then the loops shown in Fig. 23 were closed enough to retract $\overline{1/12}$ into better alignment. The patient then was instructed to bite into a bite plane as frequently as possible to encourage labial movement of $\overline{1/1}$. This procedure was followed for three weeks. Upon return at the end of this period, the patient presented $\overline{1/1}$ labially positioned to $\overline{1/12}$ (Figs. 25 and 26).

Fig. 21.

Fig. 22.

Fig. 23.

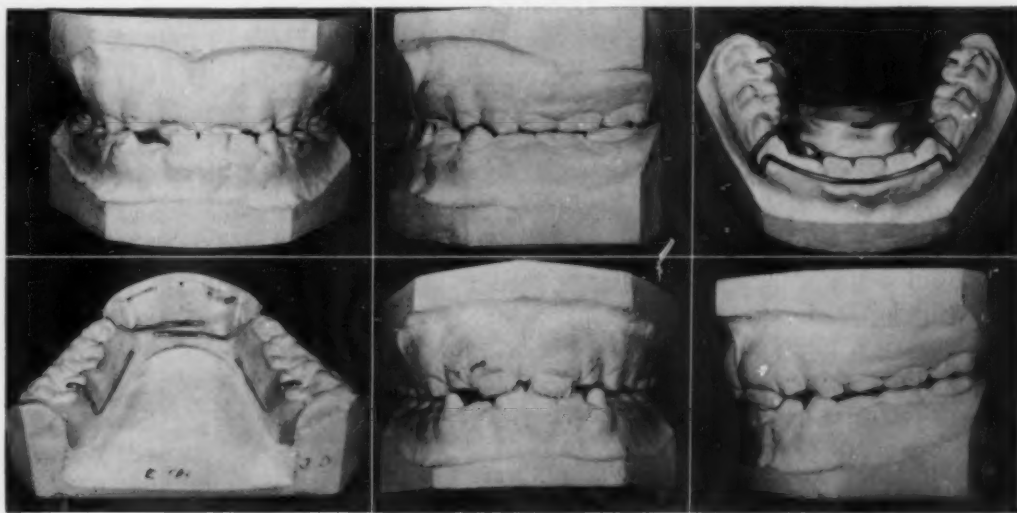


Fig. 24.

Fig. 25.

Fig. 26.

The girl was then placed on observation for one and one-half years and seen at six-month intervals in order to observe: (1) if the bite relation now established is maintained; (2) to follow the progress of $\frac{2}{2}$ as they erupt;

(3) to watch the space closure between $\overline{1/1}$; (4) to intercept a possible cross-bite development in the $\frac{2}{2}$ region as soon as and if this probability becomes an actuality; (5) to keep in close touch with the development of the Class III relation.

The examination at 8 years of age showed that $\frac{2}{2}$ had erupted into normal position, that the space between $\overline{1/1}$ had closed and the roots were in good position, and that the posterior teeth had settled into normal relation.

It was then proposed to continue the case on observation until all orthodontic risks may be dismissed.

Discussion.—The main purpose of observation is to be constantly on the alert for the development of occlusal risks so as to be in a position to intercept and guide these items into proper place with a minimum of treatment. The main purpose of observation is to enable precision of timing treatment with the development of the case, should treatment turn out to be indicated.

CASE 7.—The parents of this 5-year-old boy were very worried about the fact that the upper teeth were locked inside of the lower teeth by the forward thrust of the lower jaw. The mother said, "He is forever sticking his chin way out in front." The examination revealed a typical Angle Class III malocclusion with a full-cusp mesial relation. The erupted dentition was completely primary. The x-rays showed permanent teeth normally developed for the child's age (Fig. 27). I was interested in the possibility of hereditary evidence, so I examined the mother, the father, the brother, the mother's brother, and the mother's brother's daughter. No evidence of Class III malocclusion was found in them. In addition they did not know of any other members of the family who displayed this condition.

Further examination of the patient made it clear that it was Class III in dentition only, and definitely not of Class III appearance in any of the supporting bone structures. The mother was questioned about the thrusting habit. She informed me that the older brother of the patient was continually teasing. This made the patient very angry, and it was during these periods that the thrusting was developed and became established as a habit. With this evidence in mind a provisional diagnosis of "habit originated" Class III malocclusion was made, with heredity certainly and growth probably contraindicated as contributing factors. The patient was placed on observation and returned a year later—there was no apparent change (Fig. 28).

It was now decided to initiate treatment in order to jump the bite, and to attempt this in the primary dentition because the x-ray showed $\overline{1}/1$ well developed and the roots resorbing on \overline{A}/A , with these teeth beginning to loosen. The \overline{A}/A were removed to facilitate the treatment.

The patient returned in one month; the $\overline{1}/1$ had begun to erupt and the relation of $\overline{A}/$ to $\overline{1}/$ was almost end-to-end (Fig. 29). The bite-jumping treatment was started. The Kesling tooth positioner was selected as the appropriate appliance in this case since: (1) the patient had to travel a distance of 240 miles for appointment, and I wished to avoid appliance trouble if possible; (2) the Kesling is hard to damage; (3) very important—both parent and patient showed understanding of the case and had, in the year of observation, given marked evidence of willingness and ability to cooperate. The use of the appliance was demonstrated and the patient instructed to use it four hours daily in not less than one-hour periods—in the morning, at noon, and in the evening—and to wear it all night.

The mother called at the end of a month and said, "John can now bite end-to-end and he is doing very well in the use of the appliance." The mother was advised to have the boy continue and to come in for examination in a month.

The progress made to this point is illustrated in Fig. 30. We note $\frac{1}{1}$ $\frac{1}{1}$ assuming correct position and the change in the relations of the other teeth. It is proposed to continue use of the Kesling positioner at night only until $\frac{BA}{AB}$ begin to be lost, then to place the case on observation to watch the $\frac{B}{B}$ eruption of $\frac{21}{12}$. The decision regarding what to do next will depend on $\frac{2}{2}$ what develops.

Discussion.—The examination of other members of the family for evidence suggestive of hereditary Class III in indications in conjunction with the habit evidences for this particular Class III case provides the basic reason for the treatment and observation plan as outlined in the report.

Fig. 27.

Fig. 28.

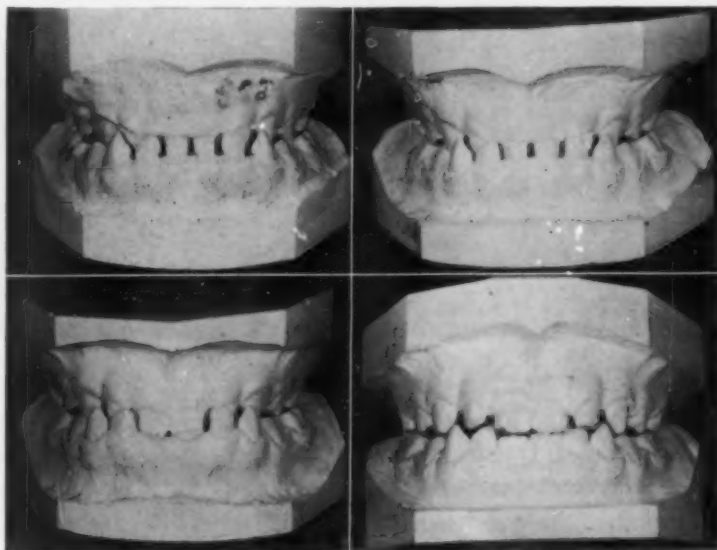


Fig. 29.

Fig. 30.

CASE 8.—The patient was a woman 20 years of age who was referred by her oral surgeon. She complained of pain in $\frac{87}{}$ area. The oral surgeon took an x-ray and found $\frac{8}{}$ to be missing. He did note that $\frac{76}{}$ were in buccoversion to $\frac{76}{}$ and that they presented marked abrasion on the lingual surfaces of $\frac{76}{}$ and on the buccal surfaces of $\frac{76}{}$. Orthodontic examination confirmed the oral surgeon's appraisal (Fig. 31).

Treatment.—The $\frac{76}{}$ were banded. Hooks were soldered on the buccal $\frac{76}{}$ surface and near the cervical surface of $\frac{76}{}$, and on the lingual surface near the cervical surface of $\frac{76}{}$. Number 1 elastics were placed between the books and through the bite as illustrated in Figs. 32 and 33. The patient was instructed to wear these at all times, except when eating, for one month. The

patient was observed at two-week intervals. At the end of the month the relations of $\overline{76/}$ to $\overline{76/}$ were near normal. The elastics were removed and progress watched for three months (Fig. 34); meanwhile bridge was placed between $\overline{3/}$ and $\overline{5/}$. The discomfort was gone and the patient was dismissed.

Discussion does not appear to be warranted.



Fig. 31.

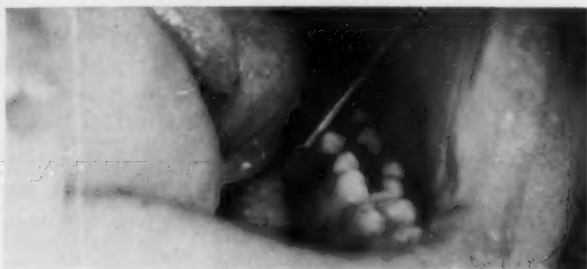


Fig. 32.

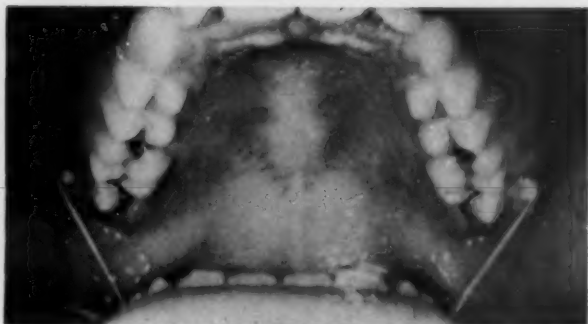


Fig. 33.



Fig. 34.

CASE 9.—This patient was a boy, aged 9 years, whose mother was concerned about the protrusion of the upper anterior teeth due to a persistent thumb-sucking habit. Her attempts to break the habit had not been successful.

The examination disclosed Angle Class I open-bite tendency with $\overline{21/12}$ protruded (Fig. 35). The active thumb-sucking habit appeared to be responsible for the distortion. The mother was dismissed and direct work with the patient was started. This consisted of a demonstration of the consequences of this type of habit by showing him the model of an extreme habit case and comparing it with the model of a normal occlusion. I said, "If you continue to suck your thumb your teeth will look like those I first showed you. If you stopped your habit last night, your teeth will improve and look more like the teeth of the second model that I showed. If I help a little after you have stopped sucking your thumb, the two of us together can make your teeth look a great deal like this model (showing him the model of normal occlusion). This is business for you and me; and you and the doctor will try to work it out without the help of your mother and father."

The patient was sent home and was called at the end of two weeks to inquire how he was getting along. This was to serve as a reminder. The call was repeated two weeks later. At the end of six weeks the habit was broken and

the patient was placed on observation for two years. At this time self-correction had operated and the occlusal relations were satisfactory (Fig. 36).

Discussion.—The patient appeared to need a little professional help to provide the psychologic impetus necessary to enable him to give up the habit. That the distortion was self-correcting depends upon other factors not presented in the description of the case. The treatment becomes simple by providing a little psychologic help from a qualified professional person at the right time.

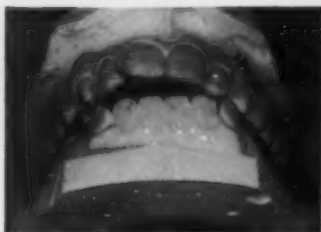


Fig. 35.

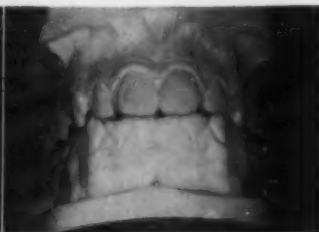


Fig. 36.

CASE 10.—The parents of this girl, aged 7, brought her in for examination and consultation because she could not bite her front teeth together. The examination presented Angle Class I open-bite with the maxillary arch distorted and the mandibular arch unaffected. The maxillary anterior teeth showed mild protrusion; the mandibular anterior teeth were neither intruded nor retruded (Fig. 37). During observation it was noted that the child rolled her tongue and continually thrust it forward into the region of the upper anterior teeth. Neither patient nor parent was aware of this, nor was it a transfer from a finger-sucking habit. The nature of the habit was explained and the patient was instructed to carry the tongue in the floor of the mouth.

The patient was seen again in one month. At this time the habit was unaffected. She returned three months later and the same condition still obtained, with no change in the dentition (Fig. 38). Then it was decided to use a habit-breaking appliance as shown in Fig. 39. The patient's tongue became very sore by the end of the first week; however, she was willing to wear the appliance longer to "teach her tongue a lesson because it wouldn't learn by itself." The appliance was worn for another six months without inconvenience to the patient. At this time the habit appeared to be broken and the appliance was removed. The dentition had greatly improved (Fig. 40). The patient returned for examination at the end of three months with the self-correction to the open-bite well in progress (Fig. 41). She was placed on observation every six months for three years; then she was dismissed with the occlusion completely normal.

Discussion.—The use of appliances to break oral habits when the problem cannot be solved on psychologic grounds by the patient and the orthodontist appears to be a reasonable procedure. However, the use of pain and fear is definitely rejected by our leading child psychologists. Consequently, it appears reasonable to avoid the use of appliances which contribute to pain and fear. That the appliance worked in this case, apparently without psychologic damage,

does not merit its recommendation in the present form. It would seem desirable to reduce the length of the spurs so that the appliance would function more to remind the patient to keep the tongue back and would have less opportunity to hurt than this particular appliance had. It is the intention to make an adaptation of this nature if another case of this type comes to me for advice and treatment.

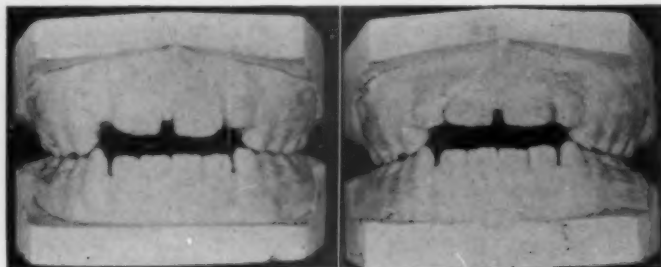


Fig. 37.

Fig. 38.

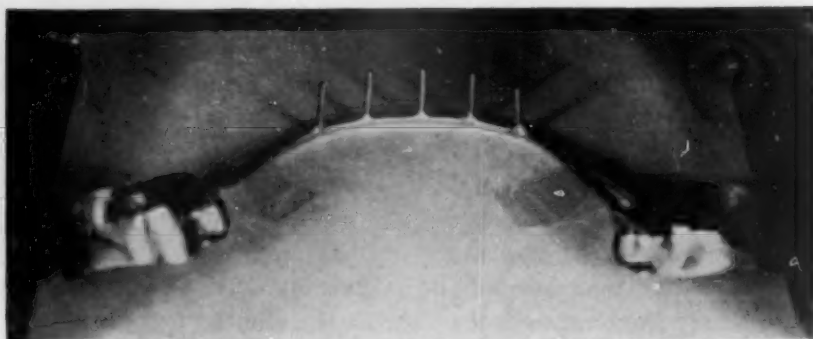


Fig. 39.

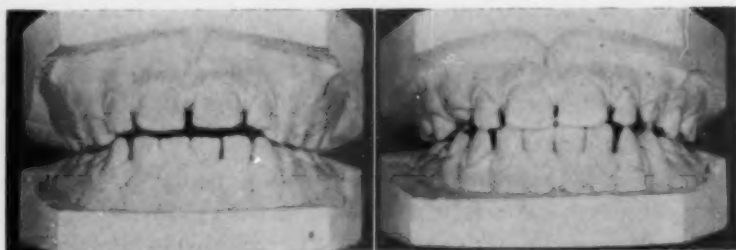


Fig. 40.

Fig. 41.

CASE 11.—This report discusses the case of a boy 8 years, 6 months of age who was referred by the family dentist who, through x-ray examination, had discovered two supernumerary upper anterior teeth (probably central incisors), and he wanted advice as to which teeth to remove in order to give the best-appearing result. The examination confirmed the appraisal made by the dentist. All four teeth were large and well formed and it was difficult, if not impossible, to decide which were the 1/1 and which were supernumerary. To facilitate

presentation, these teeth are numbered 1, 2, 3, and 4, as shown in Fig. 42. In order to obtain "best appearance," it was decided to remove teeth marked 2 and 4 (Fig. 1) for the following reasons: (1) number 2 is smaller than numbers 3 and 4 while number 1 provides good-sized balance; (2) number 4 is directly labial to $\overline{2}$.

Although number 3 was lingually locked to $\overline{12}$, this was not considered a serious obstacle to its retention since it was felt that the space provided by the removal of number 4 would make the problem of attaining normal bite relation between number 3 and $\overline{12}$ relatively easy while moving number 4 to the midline appeared rather difficult.

Even though number 1 had a long distance to move to get into proper position, this distance was not estimated to be any great obstacle in view of the fact that the crown of number 1 was already headed in that direction and the crown and root of number 1 were being prevented from midline movement by number 2. With these considerations numbers 2 and 4 were removed, the patient was placed on observation, and instructed to return for examination in six months. (The discussion will continue referring to the retained teeth as $\overline{1/1}$.)

Fig. 42.

Fig. 43.



Fig. 44.

Fig. 45.

At this time the progress is shown in Fig. 43. Now we observe that $\overline{1/}$ and $\overline{2}$ are moving as estimated, and that the lingual locking of $\overline{1}$ to $\overline{12}$ is being reduced. The use of the tongue blade, as previously described, to provide a little assistance appeared reasonable, so the patient was instructed to follow this routine for three weeks. The progress was satisfactory; the use of the blade was stopped and the patient was instructed to place the lower anterior teeth lingual to the upper teeth and thrust the lower jaw forward.

Fig. 44 shows the progress to this point. From now until 14 years of age the patient was observed at six-month intervals. Fig. 45 presents the appearance of the case at this time. Since no further orthodontic risk appeared to be involved, the patient was dismissed.

Discussion.—Observation kept the orthodontist well informed about the fact that nature was carrying the treatment plan originally outlined and needed very little assistance from the orthodontist to perform the task.

CONCLUSION

In conclusion, the essay has stressed the importance of simplicity and observation as sound guiding principles for orthodontic practice. The case illustrations have attempted to show that the use of these principles in clinical practice enables the clinician to adhere more closely to high professional standards by providing advice and guidance when requested, and treatment, always kept at a minimum, when necessary.

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SOME CONSIDERATIONS ON THE DIAGNOSIS OF MALOCCLUSION RELATIVE TO EXTRACTION

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INTRODUCTION

IT IS my privilege to discuss with you this morning a somewhat doubtful subject about which there has been a great deal of controversy and discussion. For at least five generations, as closely as I can determine, dentists in general and orthodontists in particular have been arguing and explaining the place of extraction in the treatment plan. I do not hold to the illusion that what I have to say here will bring these discussions to an end. The whole topic of extraction appears to be tied in with etiological considerations which are not yet fully understood. However, no matter what the various points of view on this subject are, we will all agree that there are several basic principles which bear strongly in giving a more complete understanding to the general problem. Some of these need additional clarification and greater recognition. Accordingly, then, I wish to present some aspects of this problem which, in my opinion, provide a better over-all approach to the use of extraction as we attempt to give orthodontic service through treatment results.

I should like to point out that I use the term results rather limitedly nowadays. I recently overheard a small boy explain the difference between results and consequences. He said results were what he wanted but that the consequences were usually what he got. Now, speaking in terms of orthodontics I think he has something. If we got the results we would not be discussing our present subject. Apparently it is the consequences which keep us talking about such problems as the place of extraction in treatment procedures.

One of the most important considerations in the diagnosis of malocclusion is the point of view of the patient himself. Before classifying the occlusion, establishing the etiology, or developing a treatment plan we must first determine the needs of the individual with whom we are dealing. We should know his reason for presenting. We should determine if he has a chief complaint. We should find out his hopes and desires in correction. We need to understand how important idealism is to him. And, last but not least, we ought to know if he can afford what he wants in terms of what it takes to obtain it. Whether we like it or not, these are important considerations. The management of malocclusion must always adhere to the requirements of adequate orthodontic service. Within the limits of satisfactory management we should attempt to secure the demands of the patient and satisfy his reasons

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for presenting. This fact becomes even more evident as we examine closely our function as orthodontists. It has been determined, in brief, that we are to establish and maintain the natural dentition for the purposes it serves. We can establish a number of uses for the dentition. The mastication of food, speech, and the playing of wind instruments are among them. However, without a great deal of soul-searching we will recognize in this day and age that by far the greatest contribution of the dentition is to facial appearance or esthetics. The presence of malocclusion within the dentition is not a life and death matter. The removal of it, then, can be dictated only on a reasonable basis which for the most part is psychological rather than physical. We must realize that the orthodontist is a specialist superimposed and greatly dependent upon a highly developed civilization. He deals with dentitions which are in a superior state of health, and he serves, in the majority of cases, to make a tolerable situation better.

All this does not mean that the practice of orthodontics is not important. On the contrary, in a civilization such as ours the orthodontist is assuming an ever more important role. The correction of malocclusion on the basis of appearance is becoming highly desirable in view of the demand for satisfactory facial appearance. To a lesser extent this is also true in regard to dental health. More and more the periodontist is asking for a well-aligned dentition to aid in maintaining healthy supporting structures, the restorative dentist wants straight, well-positioned abutment teeth, and the prosthodontist would rather deal with a patient who has developed masticating habits with a functionally normal dentition. But in a greater sense these, too, are esthetic demands since the increasing requirement of the human dentition is for appearance.

Dentistry as a health service seeks to prolong the life of the dentition so that the patient may depend upon his own teeth so long as he may need them. The presence of odd biting habits, highly irregular teeth, traumatic tooth relationships, and dentofacial imbalances does not contribute to these endeavors. Yet, in the removal of them we must be judicious in our approach to the problems which confront us. Accordingly, it behooves the practitioner who limits his services to orthodontics to look beyond his technical procedures as a "tooth straightener" and assume full responsibility for things that are dental if he is to gain his rightful place in the hierarchy of health services. For example, it does not seem to be entirely the orthodontist's responsibility to determine what the exact correction of malocclusion shall be. Some patients have specific demands. The casts of a 22-year-old man are shown in Fig. 1, *A* and *B*. He is a musician. He was not concerned about appearance. His lower lip was irritated by the irregular lower incisor when he played his clarinet. This young man was a senior in the School of Music at the University of Michigan. He had qualified for a position with the Cleveland Symphony. His main concern was with his ability to maintain the position once he had assumed it. The irregular mandibular incisor often created pain during longer periods of instrumental activity. The pain interfered with the

manipulation of pitch and tone qualities. Could something be done about it? Following the removal of an adjacent incisor, the positioning of the lingually posed second premolar, and the alignment of all teeth, the difficulty was removed. His problem was solved.

Fig. 1, *C* and *D* show the casts of another young man. He was a law student—a vain, self-sufficient individual of 26. He was referred by a dentist who wondered if the incisor irregularity needed to be corrected. This patient had never given the idea a moment's thought. However, being conscientious, he presented in the orthodontic clinic for further advice. The examination revealed a long lower lip which hid the irregularity. The supporting tissues were healthy. The appearance was no concern. The patient preferred to stay away from treatment.

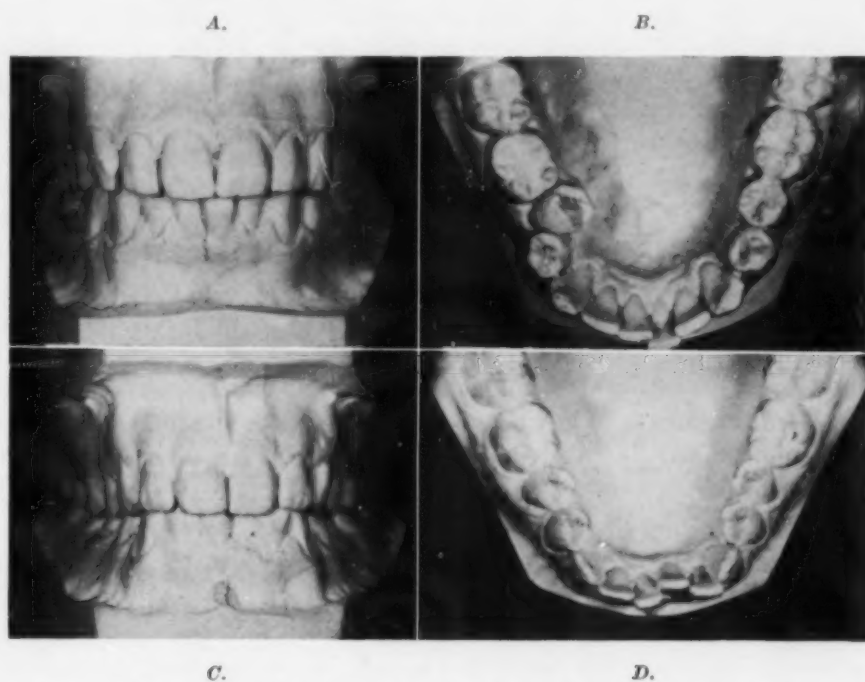


Fig. 1.—Casts of two patients having different functional requirements of their dentitions. *A* and *B*, music student; *C* and *D*, law student.

Now, if we look at the irregularity from a strictly orthodontic point of view, there is a specific answer. Yes, treatment is needed. On the other hand, this patient had no inclination for treatment. He was busy and preferred not to be bothered if the correction was not an absolute necessity. We might well have forced this man into treatment by threats and implications of changes to come. Yet it seemed better to abide by a responsible point of view. Consultation with a parodontist assured us that all tissues were healthy and that there was no need for immediate correction. We let the parodontist substantiate the value of correction to the patient and point out that treatment later would be needed if undesirable tissue changes began to take place. As demonstrated by this case, many opportunities for patient education are often

available to us. They aid considerably in identifying the real value of orthodontic treatment to the general dental service. Moreover, the advantage gained far outweighs the questionable advertising attained by flatly asserting that every crooked tooth needs straightening.

In the further consideration of the patient's desires and objectives it again does not seem entirely the orthodontist's responsibility to determine how a face shall look or what its shape shall be. We shall never forget the 12-year-old boy who came into the clinic several years ago with his father. They had only recently visited a practitioner who had suggested the extraction of four premolars. The father was much disturbed by this advice and was seeking additional counsel. An examination of the son revealed bilateral posterior cross-bites involving the first molars and some premolars. In addition, the left lateral incisor was locked lingually in occlusion to its opponent. The boy also had an obvious bimaxillary alveolar prognathism. This was typical of the father and the sister who had come along. In addition, there appeared to be a slight excess of tooth structure to supporting bone in the patient. It seemed probable that the space gained during expansion of the posterior arch to correct the cross-bites would provide room for incisor alignment. It was pointed out to the father that this possibility of deficiency was present and that alignment of all teeth would make the dentition prominent. Also, it was explained that the earlier suggestion for premolar extractions was recognition of this prominence and an effort to reduce it. The father's reply to this suggestion seemed sensible to us. He explained that all of his family had prominent teeth and that it was of no concern to him. He merely wished to have his boy's teeth aligned. He did not care to have four teeth extracted, a facial transformation, and a son who looked like someone else. In view of his insistence about this matter, it did not seem advisable to disagree with this man.

Again adhering strictly to an orthodontic point of view, we might well have recommended extraction for the reduction of alveolar prognathism had we not been forced to listen to the patient's point of view. Here, as in many of our treatment procedures, it seemed inadvisable to subject the patient to a large amount of orthodontic correction which he did not need and saw no use for. In our consideration then of the diagnosis of malocclusion relative to extraction, the patient's point of view is extremely important. Often it determines the extent to which we must go in treatment procedures. Since by our standards the management of malocclusion often involves extraction techniques, we must be certain of the requirements of the patient before committing him to a program which may be in excess of his needs and from which he cannot withdraw.

Now, of course, not all people have particular objectives in orthodontic treatment. A majority of these individuals, however, have gross dentofacial malformations. They are only interested in having their teeth straightened. Almost any plan of treatment looks good to them. Our main concern here centers around the question of how far we must go into treatment and what must be our result to satisfy the patient's demands.

Recently I had an opportunity to observe the personal reaction of two young ladies to their respective results and would like to discuss their attitudes with you at this time. Fig. 2, *A* shows the occlusion of the first girl before treatment. She had a Class I malocclusion with bimaxillary crowding. The occlusion of the second girl is shown in Fig. 2, *B*. She also had a Class I malocclusion with bimaxillary crowding. At first glance it is difficult to tell one

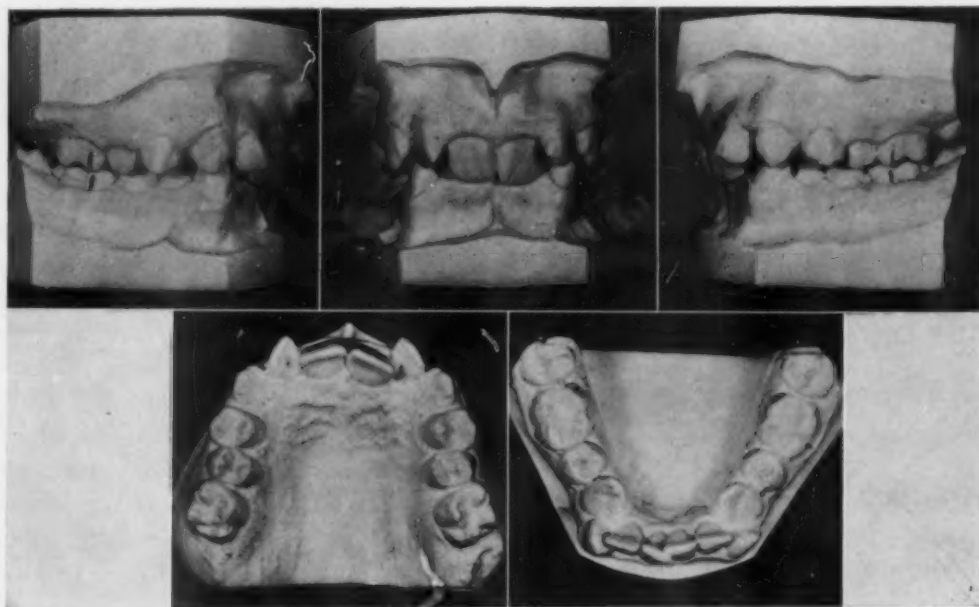
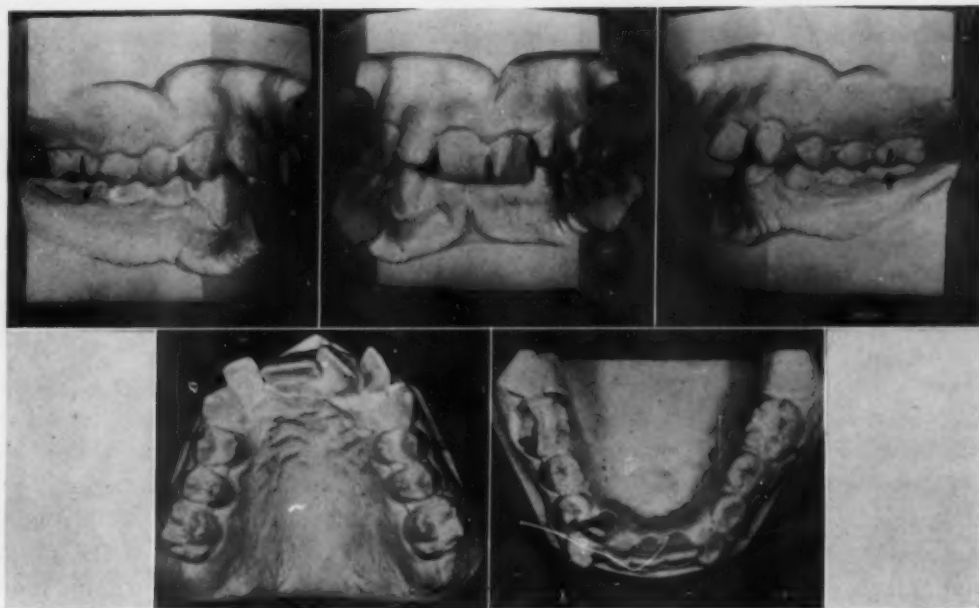
*A.**B.*

Fig. 2.—Casts of the first twin (*A*) and the second twin (*B*) taken before treatment.

from another. This is to be expected because these girls are identical twins. However, there are detailed differences within each dentition which are important. A report of their treatment and results was published in the May issue of the *AMERICAN JOURNAL OF ORTHODONTICS*. The major objective in each case was a satisfactory alignment of incisor teeth. The first twin was treated without the removal of the teeth. Four premolars were extracted from the second twin. Fig. 3, *A* and *B* show the occlusions of the girls nearly four years after the end of the retention.

I should like to recognize that you may or may not agree with the management of these dentitions on the consequences which came from it. According to our point of view, however, the handling of these malocclusions by the methods just outlined offered great opportunities for a reasonable experiment. To us the end product has fully compensated for the liberties taken. Facial and intraoral photographs of the twin treated without extraction are shown in Fig. 3, *A*. The facial esthetics are satisfactory. The maxillary lateral incisors are slightly irregular and the mandibular incisors are out of alignment. Fig. 3, *B* shows the facial and intraoral photographs of the twin from whom four premolars were removed as part of the treatment plan. Close examination reveals satisfactory facial esthetics and well-aligned maxillary incisors. The mandibular incisors are slightly irregular. Quite obviously the result in the second girl from whom four premolars were removed is esthetically superior. Yet both of these girls and their parents are exceedingly well pleased with their respective results. The first twin is well pleased to have her full complement of teeth and would have had it no other way. The second twin, in the same mood, is equally well pleased that she had four premolars removed and would have had it no other way. In these circumstances, at least, the orthodontic standard of ideal alignment is far beyond the requirements of the patient. It is not unreasonable to expect that this is so for many of the individuals whom we treat. In these considerations, then, we are not always greatly concerned with the excellence of dentition or the lack of it. We must, however, in view of the nature of orthodontic treatment be fully aware of the needs and desires of the individual patient so much as is possible. Here it is sufficient to assume only the obligation of knowing how much can be done and how to do it. There is no need to overplay our hand in an effort to dictate the standards of orthodontic treatment.

In any discussion about the point of view of the patient, it is necessary to recognize that some individuals demand the ultimate in orthodontic idealism. For the most part these people are troubled by conditions of lesser dental irregularity. In cases in which extraction is given consideration there are usually only minor discrepancies between the amount of tooth structure and the supporting bone. Here the removal of teeth in the treatment of malocclusion can easily provide more space than is needed for the alignment of the dentition. Accordingly, the higher becomes the demand for idealism the more serious becomes the problem of extraction. The amount of argument and discussion about this point of view is well recognized. I certainly do not propose

to settle it at this time. However, as we go toward idealism in the correction of malocclusion we must consider every possible means to obtain it. The extraction of teeth offers one opportunity for the management of the dentition along these lines. The use of extraction, however, imposes a strict responsibility upon the operator. If, following the removal of dental units for orthodontic advantage, the practitioner is unable to obtain ideal results and unable

A.



B.

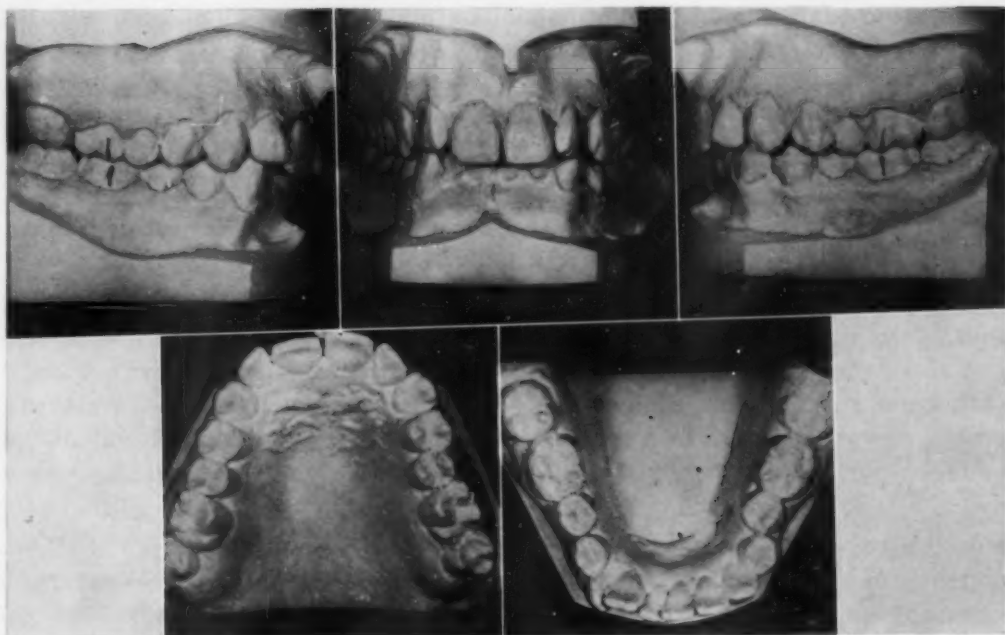
Fig. 3.—Facial and intraoral photographs of the first twin (A) and the second twin (B) taken nearly four years after the end of retention.

to close the space created in a manner satisfactory for the health of the dentition, he has failed in his responsibility to the patient. The mere removal of teeth does not dictate success in treatment procedures. It is not a panacea for all orthodontic ills. We are told by no lesser an advocate of extraction than Dr. Charles Tweed that space closure requires the ultimate in orthodontic management if results rather than consequences are to be attained. This fact is well illustrated by the treatment results of the twin girls presented in this discussion.

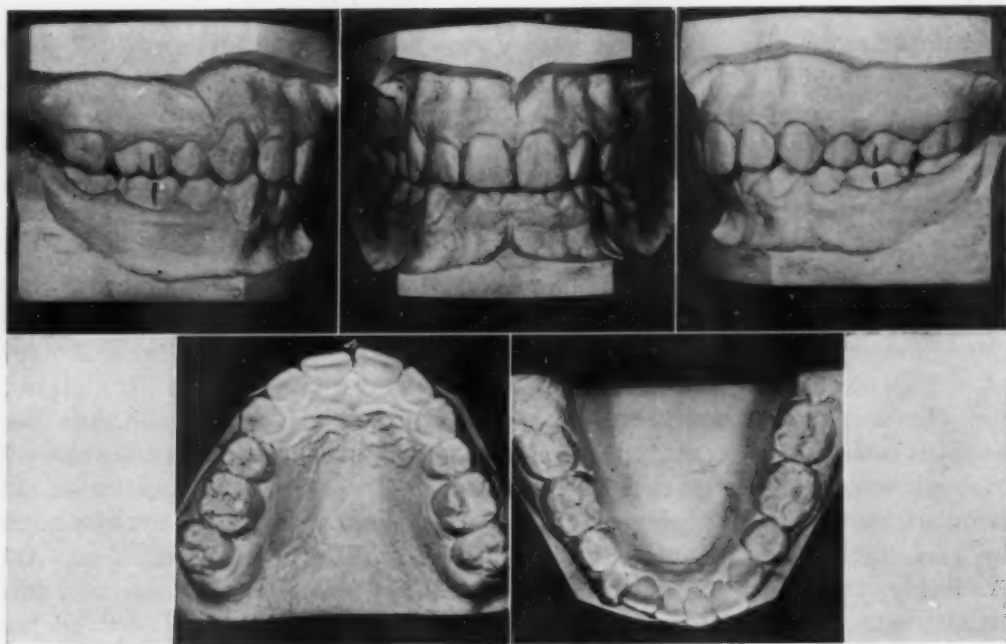
Fig. 4, *A* permits a closer examination of the changes from good alignment to minor irregularity in the twin without extraction nearly four years after the end of treatment. This girl like her sister was treated in the graduate clinic at the University of Michigan. They had a series of operators with varying skills and abilities. In spite of this experience, the girl shown here has probably received almost as much from the treatment procedures as could have been expected in any hands. The other twin from which four premolars were removed is shown in Fig. 4, *B*. Partly due to a lack of cooperation, partly due to a lack of operator continuity, and possibly due to the fact that she did not have her mandibular right horizontal impacted third molar extracted as advised, there is mandibular incisor irregularity. These teeth do not show the results for which the extractions were intended. Consequently, we cannot use this example as a critique against extraction. Rather it reaffirms the necessity for high professional skill in any treatment procedure. Additional evidence to support this claim is shown in Fig. 5. The superimposed tracings were made from lateral headplates taken of the patients nearly four years after the end of retention. The twin from whom teeth were removed is indicated by the solid line. Here, although the incisors have tipped lingually, the molars have come forward. The mandibular incisor angle for this girl is 92° . According to Dr. Tweed this is an excellent degree of inclination. Yet, as we observed in the preceding figure, the patient still has irregular incisors.

In the twin without extractions (dotted line), the mandibular incisal angle is 100° . According to some points of view this girl should have a bimaxillary alveolar prognathism. This relationship between the teeth, the alveolar bone, and the supporting apical base bone has been inadequately described by orthodontists as bimaxillary protrusion. It is interesting to note that in spite of the 100° mandibular incisal angle, and the corresponding protrusiveness of the maxillary incisors, the superimposed lip line is almost identical. This point is of interest in view of our professed inclination to extract teeth for the reduction of midfacial prominence. Again there is no doubt that some patients object to prominent facial features. More often, however, it is the orthodontist who initiates these treatment objectives.

It has always been of interest to me, from a diagnostic point of view, to know that the staff members who originally diagnosed these cases decided to extract from the one twin because her face and jaws were slightly smaller than those of her sister. They did not have cephalometric x-rays to make these initial evaluations. As shown here, their judgment about jaw size was correct



A.



B.

Fig. 4.—Casts of the first twin (A) and the second twin (B) taken nearly four years after the end of retention.

even though the difference was not great. This fact indicates that critical observation of the dentofacial components many times can provide us with sufficient evidence for a diagnosis and often relieve the financial load of more elaborate diagnostic paraphernalia to both the patient and ourselves.

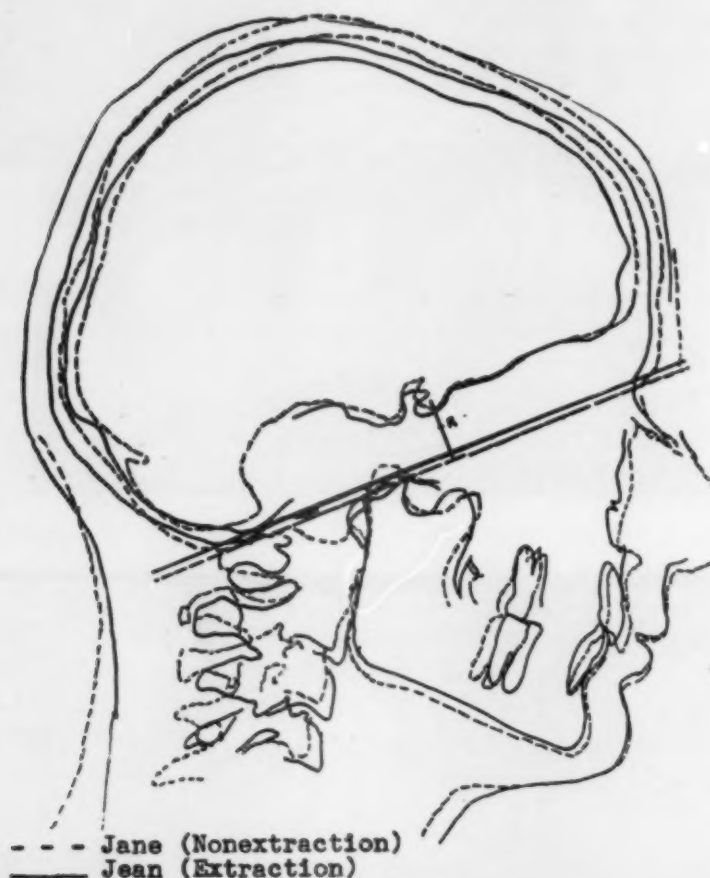


Fig. 5.—Superimposed tracings made from lateral head plates taken four years after the end of retention.

The treatment results of the twins shown here demonstrate then the liabilities of extraction procedures once they are initiated. That the removal of teeth makes treatment procedures easier is an overworked and fallacious point of view. Even the most judicious use of extraction can be confounded by inadequate or unfortunate management of the remaining dentition. Accordingly, the treatment of malocclusion along these lines imposes an additional responsibility upon the practitioner. He is obligated to produce the results or leave the case alone. For this reason it is advisable whenever possible to pay close attention to the point of view of the patient in the consideration of the diagnosis of malocclusion relative to extraction. When confronted by problems in which the role of extraction is a questionable one, it seems only reasonable to resolve it in terms of the needs of the patient. If

idealism is a necessity, then the removal of teeth and the subsequent appliance manipulations must be deftly and skillfully carried out. On the other hand, when by the inclination of the patient idealism is not needed, the orthodontist can leave slight discrepancies and still provide a satisfactory dentition for the purpose it serves. Whatever may be the attitude of the clinician about this point of view, we suggest that it be developed on a factual basis rather than on ideal postulates. Part of these facts are the point of view of the patient. Any orthodontist who does not recognize them is badly advised.

Now then, if we are to look at extraction procedures from the patient's point of view in the treatment of malocclusion, it is necessary to be very exacting in our diagnostic analyses. It is as much our responsibility to know when the removal of teeth is of value to the patient as to know when it is not. There are, of course, many anatomical relationships which modify our thinking in the diagnosis of malocclusion relative to extraction. Before initiating a discussion about some of them, let us look at the nature of our so-called "extraction procedures."

It is imperative to keep in mind that the removal of teeth for orthodontic advantage is a treatment technique. As such, it is of secondary consideration in the evaluation of malocclusion. Technically it has nothing to do with diagnosis. The removal of teeth is a part of the treatment plan. We elect to extract in the correction of malocclusion *only* on the basis of its contribution to the desired result, just as we might select edgewise appliances over the twin arch appliances in an individual case. Accordingly, then, we do not approach the evaluation of malocclusion in terms of whether or not it is an extraction case. When we elect, as we have done here, to discuss the management of malocclusion relative to extraction, we then consider the nature of the problem in cases in which extraction is of probable advantage. We evaluate all those features peculiar unto malocclusion which make us think that extraction is indicated, or not indicated, in the treatment of it. Before proceeding in such a discussion, however, it seems only reasonable to point out that extraction is not always of major concern in the orthodontic practice. In many cases there are obvious excesses of tooth structure as compared to the supporting bone and we resort to the removal of teeth as the only means of bettering the situation. On the other hand, there may be too little tooth structure, as evidenced by varying degrees of spacing, and extraction is given no consideration. In between these two extremes, however, lies a great group of the so-called "borderline deficiency" malocclusions. For these cases any estimation of the place of extraction in the treatment plan is often difficult and requires careful examination. It is this type of problem with which we are concerned today.

One of the most important requirements of the orthodontist in considering the problem of the borderline deficiency malocclusion is that he recognize the relationships between the teeth, the dental arches, and the supporting bone. As our evidence accumulates, it is becoming apparent that within the limitations of growth the apical base is a fixed relationship. To a lesser extent this is also true of the alveolar bone. The alveolar bone can be directed somewhat

during the growth period. In addition, we can reduce it and we do so when we extract. On the other hand, we cannot replace it once it has been destroyed, and herein lies the crux of the extraction problem. As dental practitioners, we are obliged not to destroy tissue unless this loss is highly beneficial to the patient who sustains it. We cannot sidestep this responsibility and maintain our position as a responsible professional group. Fortunately, the dental arch is more variable. It can be modified within the limits of its supporting alveolar bone. If lost we can replace it. With appliances we can align almost any combination of dental irregularity. Experience, however, has taught us that when we shape the dental arch to a form which varies greatly from that of its supporting alveolar bone and apical base our modification is not a stable one. Thus we are obliged to work within the confines of the individual arch form.

Since arch form, and by this I mean the teeth and alveolar bone, is to limit what we can do in our corrective procedures, it is of major importance in the diagnosis of malocclusion to consider the significance of arch form upon the treatment. In observations of this nature lie some of our greatest opportunities to determine probabilities of aligning and spacing of teeth as against extraction and the closure of space.



Fig. 6.—Casts of a tapered maxillary arch taken before (A) and after (B) extraction of first premolars.

There are a number of variations in arch form which can be observed within the human dentition. Some observers define six, namely, the tapered, the trapezoid, the ovoid, the U-shaped, the hyperboloid, and the squared. The last two types are rarely seen. For this reason we shall limit our discussion to those types most usually encountered in the practice of orthodontics. They are the tapered, the trapezoid, the ovoid, and the U-shaped arches. The opportunities for the management of a full complement of teeth vary within each type. The tapered arch is at one extreme in this classification. It is shown in Fig. 6, B. As shown here, the tapered arch converges from molars to central incisors to such an extent that lines passing through the central grooves of the molars and premolars intersect a short distance anterior to the central incisor. An occlusal view of the cast (Fig. 6, A) reveals the teeth present to be in good relationship to the supporting bone. The incisors are somewhat irregular. The canines bulge the mucosa and are about to erupt. However, the spaces available to them are inadequate for proper alignment. There is no opportunity for these

teeth to assume their position in the dental arch. In spite of all this, it is possible through treatment procedures to make room for the canines in this dentition. By expanding the molars and premolars and by flattening out the anterior teeth in a labial direction, it would be possible to align the teeth in this jaw. On the other hand, the nature of the dental arch created would be far different from that of the supporting bone.

Without retention we would have a gradual change of the teeth back to a shape in keeping with the basal bone. In this instance then there was no opportunity for alignment of all the teeth in this dentition. For the most part whenever there is an excess of tooth structure over supporting bone in the long tapering arches, this conclusion holds true. There is little chance for manipulation of the dentition into a stable pattern. Accordingly, we think in terms of extraction procedures in the management of the malocclusions superimposed upon these types of supporting structures. In the case shown here as evidenced by Fig. 6, *B*, two premolars were extracted. The erupting canines are moving into adequate space. There was no need to await the completion of the permanent dentition to make this diagnosis. The basic arch form was fixed and modification of the dental arch during the growing period was indicated.

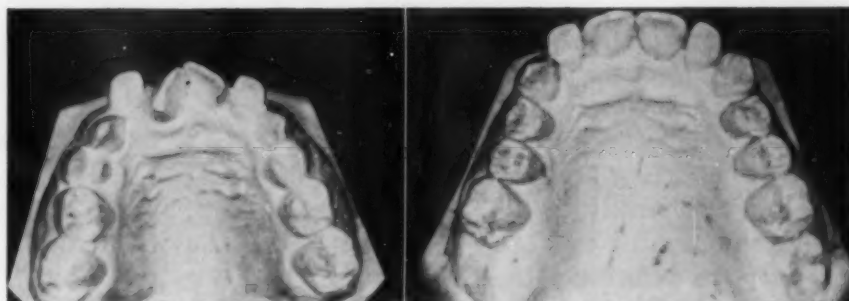


Fig. 7.—Casts of a trapezoid maxillary arch taken before (*A*) and after (*B*) treatment.

Whenever we can make early and definite diagnosis of the type illustrated here, we have great opportunities for the management of malocclusion. By timing and pacing our extraction procedures in keeping with the growth rate of the individual, we can often reduce the treatment period. In addition, the applianceing is easier and occasionally unnecessary. In Fig. 6, *B* when the canines are in occlusion, only minor incisor alignment will be necessary to bring the treatment to a satisfactory end.

A trapezoid arch is shown in Fig. 7, *B*. In form it converges in variable degrees from molars to canines and is abruptly rounded from canine to canine tip. Fig. 7, *A* is an earlier record made of the same individual. Looking at it from the occlusal aspect we realize that this arch is not as clearly defined as the lower one. On the left side where the deciduous canines and molars are present there is definite inclination to the narrow tapering arch form. On the opposite side where the first premolar is partly erupted the nature of the arch is different. This is not unusual.

Barrow and White,¹ in a report presented at the 1944 research section of the American Association of Orthodontists, indicated that there is noticeable change in the shape of dental arches during their development from the deciduous to the permanent dentition. These changes are more pronounced in the broader arches and less pronounced in the narrower ones. In our classification the trapezoid arches are only one step broader than the tapering types. Yet we already note by the position of the erupting first premolar in Fig. 7, A that the potentiality for a wider dental arch is present. Here, however, our circumstances are somewhat different from those within the tapering arches. As indicated by our definition, the trapezoid arch has greater width at the canine and premolar areas. Accordingly, we have more room for manipulation of dental units. Whenever there is a borderline deficiency relationship between the teeth and the supporting bone, we have license to attempt the reorganization of the dentition for a stable result. If the patient does not demand idealism, we can almost always provide a dentition which satisfies his needs without resorting to the risks and obligations of extraction procedures. The case in Fig. 7 illustrates this point very well. As demonstrated by the upper cast there are deficiency factors present in this individual. A critical examination of the supporting bone, however, suggests that the dental alignment belies the probabilities for support of the teeth. Because of these probabilities the treatment of this dentition was directed along lines to develop the trapezoid arch, as shown in the lower cast. In this result (or consequence, whichever you may choose) it is apparent that there is no excess of supporting structure. There is a very close balance between the teeth and the supporting bone. Without creating additional space little more can be done for this patient in the way of tooth alignment. Yet this individual by his own testimony and that of his parents has a satisfactory dentition which serves his purposes exceedingly well.

Now the management illustrated by Fig. 7 was not suggested entirely by the relationships observed here. As in all cases there were other diagnostic data which helped to dictate the nature of the treatment plan. Several years previous to the treatment of this patient an older brother had received a similar correction. The older brother's dentition was quite like the one shown here. The treatment procedures were also the same and the end result had held up amazingly well. When the second boy presented for treatment, it seemed only reasonable to expect that he, too, might receive a favorable correction without resorting to the removal of teeth. At this time the mother and father were also examined. The examination revealed that both parents had medium-width arches, one trapezoid and the other ovoid in nature. In addition, there was no highly objectionable dental irregularity in either parent. On the basis of these findings treatment for the second boy was initiated without creating more space. Here, as in our earlier consideration of growth changes of the dental arch, the result shown is neither unusual nor unexpected.

Moore and Hughes,³ in their report on "Familial Factors in the Diagnosis, Treatment, and Prognosis of Dentofacial Disturbances," pointed out the extensive operation of heredity in the production of features in the dentofacial

complex. They emphasized that the most important contribution hereditary knowledge makes to diagnosis is in the outlining of expectation for the growing child. They added that this is particularly true in those portions of the face which are markedly influenced by age. They advised that we can be guided in our efforts to estimate the opportunities for aligning and spacing of teeth within the supporting structures.

In their analysis of arch form we note that arch form is strongly dependent upon hereditary circumstances with a general dominance of narrow or constricted arches over broad ones. Thus, if we know whether one, the other, or both parents present constricted arches, we are provided with a considerable body of evidence about the probable course of the development of the child. When the long, tapering arch is present in one or both parents, we do not try to develop the dental arches to greater limits. The probabilities that we can get away with it are remote, and we resort to extraction procedures on a reasonable basis. On the other hand, when we see medium to large dental arches in both parents we are more optimistic. We can consider aligning and spacing *in terms* of favorable results.

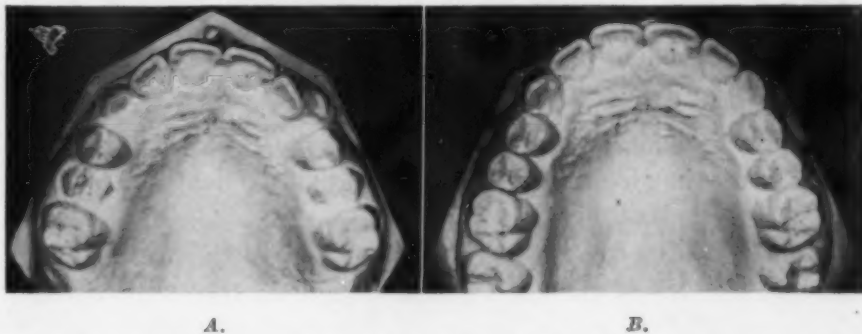


Fig. 8.—Casts of an ovoid maxillary arch taken before (A) and after (B) treatment.

An example of an ovoid arch is shown in Fig. 8, B. Here the arch curves continuously from the molars on one side to the molars on the opposite side in such a way that two casts placed back to back describe an oval. In the ovoid arches there is greater opportunity for the alignment of all teeth than in the trapezoid forms. Often it is possible to round out the dental arch and still stay within the confines of the supporting bone. The models in Fig. 8 demonstrate these possibilities. Fig. 8, A is an occlusal view of the maxillary arch taken before treatment. The right maxillary canine is erupting into adequate space. The second premolars also appear to have room for eruption. The left central and lateral incisors are distally posed as compared to the position which the right incisors have assumed. In this case the dental arch has a trapezoid characteristic. Yet the alveolar bone has a greater potentiality to support than is indicated by the alignment of teeth. On the basis of this probability treatment was planned without extraction procedures. The premolars were expanded slightly and the left side of the arch was elongated and rounded out. In this case the plan of treatment was again supported by hereditary data. The mother had a large trapezoid arch and slight dental irregularity.

The father had a medium-sized ovoid arch with teeth rounded out in good alignment. Had there been a definite deficiency malocclusion in either of the parents, we would have followed our first inclination which was to extract.

The analysis of arch form as an aid in determining the need for extraction or nonextraction in treatment often is more difficult than has been demonstrated here. As has been pointed out, there are sometimes changes in arch shape during the transition from the deciduous to the permanent dentition. More often the arch itself is not clearly defined. Many arches are borderline nature and the classification of them is a difficult procedure.

In these situations it is hard to know exactly the nature of the probabilities with which we are dealing. Yet our obligation as orthodontists requires that we be considerate in the management of malocclusion and direct our efforts to the best interests of the patient. Many times, however, we are confronted by situations in which the etiological data are not sufficient to make a decision. We are forced then to resort to other diagnostic aids which can increase our understanding about the nature of the individual with whom we are dealing. One technique which enables understanding is the practice of observation. The collection of systematic records over a period of time will provide us with much information about a case we do not understand. This is particularly true for problems occurring in the transition stage. Here we can observe the changes in crowding and spacing, in arch width and shape, and come to know the direction in which the individual dentition is proceeding. Another technique is treatment itself.

Often we would like to explore the possibilities of managing a full complement of teeth before resorting to extraction in the treatment plan. In this analysis the use of palliative treatment techniques to test our diagnosis is a warranted and reasonable procedure. Before committing ourselves to extraction from which there is no recovery, we can space and align in an effort to determine if the supporting bone can accommodate the teeth that are present. At first this suggestion may seem overcautious. Yet, I think that we will all agree that a treatment plan which is based on a tested diagnosis is far safer and more comfortable to both patient and operator than one which is confounded by the promiscuous use of extraction and the sickening realization that we have removed too many teeth for the good of the patient.

A nearly U-shaped arch is shown in Fig. 9, *B*. The U-shaped arches present little difference in diameter between the first premolars and the last molars. The curve from canine to canine is so abrupt that a capital "U" is formed. For the most part these arches are not commonly observed in our population. The arch here is not a typical "U" type. It is intermediate between a trapezoid and U-shape. Yet it demonstrates the probabilities which are associated with the latter type. In the U-shaped arches the jaws are usually large and the alveolar bone massive. Whenever problems involving irregular teeth occur within arches of this nature, there is great opportunity for aligning and spacing. We seldom think in terms of extraction.

Again, Fig. 9 presents an example of treatment under these conditions. In *A* there is irregularity of central and lateral incisors. The patient occludes so that the right lateral incisor is in cross-bite with its opponent. As illustrated this tooth has grown lingually into the palate. The left central and lateral incisors bite end to end and partially in cross-bite with their opponents. Although not shown here, the mandibular incisors and canines are in good alignment. The mother stated that the patient was troubled by too long retention of deciduous incisors. With the exception of the maxillary right central incisor, all permanent upper incisors erupted lingual to their deciduous predecessors. In each case the deciduous teeth had to be extracted after the permanent teeth had come into the mouth. The mother had large jaws and well-aligned teeth. The father had a functional anterior cross-bite in which the mandible was not excessive in size over the maxilla. In addition, all of his teeth were well aligned. This background is typical of malocclusion in the U-shaped arches. Irregularity is of local rather than of deep-seated causes. For this patient, after less than six months' treatment, as shown in Fig. 9, *B*, the cross-bites were corrected and the maxillary incisors are occluding nicely against the untreated well-aligned mandibular incisors, so much as the appliances will let them. The canines are slowly erupting into adequate space. There has been no arch expansion. The remaining treatment procedures will be directed only to give the anterior teeth a little more character while the canines are coming in.



Fig. 9.—Casts of a U-shaped maxillary arch taken before (*A*) and after (*B*) less than six months of treatment.

Arch form then dictates to a great extent the management of malocclusion relative to extraction. In the correction of dental irregularity we are concerned many times with the advisability of aligning and spacing dental units as against the advantage of extracting and closing spaces following the removal of teeth. In some types of malocclusion the needs are evident, and we proceed accordingly. Within the "so-called" borderline deficiencies, however, the decisions are not always clear-cut and we need to resort to all available knowledge in determining the best manner of managing the case. In these determinations the study of arch form is of utmost importance. In general, it gives us the clue as to what we may hope for in the treatment of malocclusion. As has been demonstrated, these possibilities are limited in the long, tapering arches.

They are greater in the trapezoid and ovoid arches but usually conditioned by the factors of growth and heredity. In the broader U-type arches the opportunities for alignment are almost unlimited.

There are, of course, many other factors which make us think about the place of extraction in the treatment plan. The differences in shape and size between arches, the presence of asymmetries within and between arches, and the irregularities set up by developmental disturbances of local origin are but some of the conditions which make us pause and ponder the advantages and disadvantages of removing teeth. Yet the treatment probabilities for all of these relationships appear to hinge on our ability to manage the malocclusion within the bone which supports it.

In closing, then, let me recall four main points which to me are of major importance in this consideration:

1. Extraction procedures are necessary and important treatment techniques in the practice of orthodontics.

2. The frequency with which extraction need be used will depend to a great extent upon the nature of the results required. Here, we recognize that patient requirements are important and that any result toward which we work should fulfill these requirements so long as sound orthodontics is practiced. In addition, we must realize that arbitrary decisions on the part of the orthodontist alone apropos of what treatment should be are not always reasonable nor recommended in view of the nature of the service which we render.

3. The use of extraction is not and cannot be considered a short cut or expedient form of treatment since it almost always superimposes additional responsibilities upon the practitioner for the management of space.

4. The use of extraction, like the use of any other treatment technique, depends upon a comprehensive recognition of the biology and growth in the dentofacial complex. Without this recognition and use, extraction procedures can only extend controversy and argument through a maintenance of opinion and belief. Whereas, by enlarging our understanding through integration of basic scientific knowledge and carefully evaluated clinical experience, we can assure the place of extraction in the practice of orthodontics.

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SOME ORIGINAL INVESTIGATIONS INTO PRESSURE HABITS AS ETIOLOGICAL FACTORS IN DENTOFACIAL ABNORMALITIES

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IT IS often said and generally agreed to that a picture is worth 10,000 words, and I am going to show some pictures made during an investigation of the postures of children taken during sleep. However, the main purpose of this paper is to review again with the orthodontic profession the importance and value not only of recognizing but also of emphasizing to the patient and the parents the extreme importance of abolishing the pernicious pressure habits indulged in by our patients.

If it is possible for us to correct dentofacial anomalies with three ounces, or less, of pressure in the treatment of malocclusions, it is certainly true that ten or twenty pounds of pressure against the facial structures will create extreme malocclusions and facial abnormalities. The difficulty confronting the orthodontist has been that of obtaining concrete or visual evidence of these harmful habits and correlating them with physiologic bone changes.

If the subject matter presented in this paper provides the members of the orthodontic profession with sufficient visual evidence to correlate even a small percentage of the malocclusions which they are called upon to treat, it is believed that the time and effort expended in the preparation of this material is justified. We as orthodontists must constantly keep these pressure habits in mind, watch our patients for leaning habits in the office, and constantly remind them of their errors. With intelligent cooperation of the patient and the parents, it is surprising and gratifying to see how readily some of our most complicated cases will respond to treatment after the habit has been eliminated.

EFFECTS OF PRESSURE ON OSSEOUS STRUCTURES

At this point it may be pertinent to review a few laws of bone growth. Wolff's law is usually stated in the following manner:

Every change in the form and function of a bone or of its function alone, is followed by certain definite secondary alterations in its external form in accordance with mathematical laws.

There has been a considerable amount of controversy over inserting mathematical laws into the biologic aspects of bone absorption and bone repair. Keith formulated a law of bone growth in much safer language. He said:

Osteoblasts at all times build or unbuild according to the stresses to which they are subjected.

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Harris said:

The rate of atrophy and absorption of bone is as remarkable as its rate of deposition. The atrophy and absorption of the alveolar margin of the jaws after extraction of the teeth are only equaled by the rate of repair of a fracture in the long bones.

We have all seen pictures of dark-skinned native girls of certain foreign climes wearing heavy necklaces. As time goes on, other necklaces are added until the neck is elongated two or three times its normal length. The woman with the longest neck is considered the most beautiful of all. The rings have forced the osteoblasts to proliferate and build more bone.

Another example of Wolff's and Keith's laws is the old Chinese custom of binding the feet of the female child. These bony structures have been deformed according to the stresses to which they are subjected. We have all seen pictures of such feet and they appear as mere stumps on which the children toddle as they walk. This is a classic example of the effect of pressure in producing bone deformities. Another classic example of the effect of pressure on osseous structures is the shoe-bound foot of today. Many of us have a foot which is curved on the inside and curved on the outside, the little toe is twisted and distorted, and the remaining toes are cramped. Nearly all of us show the effects of pressures on the osseous structures of our feet. These deformities have been universally represented in art since 600 B.C., as seen in pictures and statues of the gladiators. The deformity was caused by the cross thong on the sandal. Investigation of shoes worn during the Dark Ages shows that these deformities of the feet were as common then as now. Among the most common of these are hammertoes, overlapping toes, weakened feet, flat feet, injury to the transverse arches, and crumpled toes, all caused by pressure.

According to Young, "Since foot deformities occur very early during adolescence it is exceedingly difficult to find a normal foot among civilized people; and when found it will usually be discovered that the possessor has not worn shoes during this period."

Another deformity caused by pressure is kyphosis or round shoulders. This condition is of very frequent occurrence among school children, dentists, tailors, cobblers, carpenters, and laborers. It is at first a simple posture due to occupation and eventually becomes permanent due to changes in the bone in accordance with Wolff's and Keith's laws. These bony structures can be brought back to their normal anatomical position by correct exercises which strengthen the necessary muscles. This again is in accordance with the laws mentioned.

A condition of the spine called lordosis occurs among Mexicans, Cubans, and Tierra del Fuegians. It is present in professional contortionists, and according to Young occurs in those races and occupations in which heavy burdens are carried on the head. These burdens cause a backward curvature of the spine. Many Mexican and Indian skulls reveal bone deformities caused by the pressure of such burdens.

Lateral curvatures of the spine are many times caused by faulty postures. This condition is called scoliosis and is a classical typical deformity among

artists' models and is also common in children. The deformity is produced in an interesting manner. In cases of fatigue an attitude of rest is assumed and the entire weight of the body is thrown to one side. This causes an elongation of the leg which is relaxed, while the other leg which is carrying the weight of the body remains normal. When the child assumes a normal standing position, the increased length of the extended leg causes the pelvis to tip with a corresponding curvature of the spine.

Another group of deformities are known as vestmental deformities and are caused by the pressure of such things as clothing, shoes, and corsets. One can readily visualize the results of tight corsets as exemplified in the female figure around the turn of the century.

The last thirty years have shown a great improvement in the physique of young girls, and today the vestmental deformities due to improper clothing are practically nonexistent.

Malformations caused by rickets in conjunction with pressures are coxa vara, curvatures of the diaphysis, pigeon breast, knock-knee, and bowleg. The mechanism causing rachitic deformities is well understood and applies to the facial structures as well as to the long bones.

Young said, in speaking of rachitic conditions:

During the second stage of bone softening the superincumbent weight deforms the bones, and they retain this deformed shape after they have become consolidated and hardened during the third stage.

These changes may take place in a couple of weeks. The whole sequence occurs with great rapidity; orthodontists must constantly bear this in mind because if a child makes a habit of sleeping on his stomach, indulges in other pressure habits, and, in addition to this, has a deficient diet with resultant rachitic tendencies, great harm can be done in a short while.

According to Macewen:

The effect of soft tissue in maintaining the form of the bone may be considerable, even the weight of the tissues have their result. The tongue, physically at least, is a soft organ, and yet its complete removal often produces in the course of years a marked alteration in the shape of the lower jaw, which generally falls inward so as to permit the teeth to slope markedly toward the buccal cavity. Normally the form of the lower jaw is maintained by the soft tissues within the mouth.

Another example of the influence of pressure on osseous structures is that of retarded growth in the extremities such as the aftereffects seen in infantile paralysis. As a result of the effect of paralysis and nonuse of the muscles, we often see one leg two or three inches shorter than the other, and much smaller.

Grey pointed out:

Atrophy has occurred and the bone is lighter in weight, smaller in diameter, and weaker than a corresponding normal bone. These structures have the capacity of responding to stimuli. . . . Walking the streets of any city of any size in this country and abroad, we see the hunchback, a tragic picture of a distorted human being, because of someone's neglect—neglect of what? Of the simple fact that diseased pathologic bony tissue must be protected from the pressure of superimposed body weight. At some time in each of these cases the tuberculosis bacilli invaded the bodies of one or several vertebrae, and as soon as nature stopped the acute active process by walling off the infection, the pain began to subside and

the patient was allowed to get up. With the superincumbent weight of the upper trunk applied to the honeycombed vertebral bodies, what else can we expect but eventual collapse and gross deformity at the site of the pathologic condition with grossly impaired function?

Another deformity the orthopedist frequently sees, which is the direct influence of pressure concomitant with a pathologic process, is that of genu varum, or bow legs, in the rachitic child. Less frequently, genu valgum, or knock knee, results from the same cause, as the result of the softening process of the bone, resulting from imperfect deposition of lime. In the correction of such deformities, if they are seen early, we rely on pressure in some form, applied either by daily manipulation or by braces exerting a constant pressure, with therapeutic measures to combat the rachitic process.

Buchman stated that Mau has shown that rapidly growing bone is physiologically weak. If during rapid growth an imbalance occurs from an increased stress or strain or a decreased ability to withstand stress or strain, a disturbance of the normal growth process occurs. This in turn causes irregularities of growth and possibility of compression fracture.

The radiographic appearance of the various osteochondritides is very similar. There are areas of condensation and rarefaction, the epiphyseal line is constantly widened, and the outlines are indistinct, hazy, and mottled. These conditions are self-limited and are terminated at the completion of ossification; until the completion of the ossification process, the bone should be protected from pressure or further deformity will result.

Wullstein reported in Lovett's book on several experiments of bandaging young dogs for months with the spine bent in various positions. A permanent distortion of the spine was the result and it could not be removed by traction after death.

The consensus of opinion of research workers in this field is that bone resorption occurs during pressure periods and bone repair occurs only when pressure is relieved.

PRESSURE HABITS AS THEY AFFECT THE DEVELOPING MAXILLA AND MANDIBLE

According to Brodie, "The face presents the most complicated growth problem of the entire skeleton and our present knowledge is the result of many investigations from different points of view." Strang said, "The face increases its size about twelve times from birth to adolescence, while the cranium increases only about four times." Thus, it is easily ascertained that the greatest growth changes in the head are being made by the facial structures.

The maxilla grows downward, forward, and laterally. The mandible grows upward, forward, and laterally. As the mandible grows in the vertical dimension, increasing the vertical dimension of the face, the rami also become longer to accommodate this growth and maintain this position in the mandibular fossa. An active growth center is found in the necks of the condyles. This growth center remains active even after the eruption of the third molars.

Forward growth of the mandible is accomplished by additions of bone on the posterior border and absorption of bone along the anterior border of the rami. By this absorption and deposition of bone the mandible is lengthened

and room is gained for the eruption of the molars. There are also additions to the alveolar process in the anterior region with a resulting absorption of bone on the lingual side. There also seems to be a growth center between the body of the mandible and the rami. The mandible grows laterally by means of lateral additions of bone and resorption of bone on the medial surfaces. The condyles are carried laterally because of the lateral growth of the base of the skull carrying the condyles with it as they rest in the glenoid fossa.

Lateral growth of the maxilla and the mandible is stimulated to a great extent by the developing teeth in the bones and the necessity for their eruption.

The most active growth center for the anteroposterior growth of the maxilla is at the tuberosity. This center houses one developing molar bud after another, and this center grows by new bone formation on its posterior surface. Thus the maxilla develops posteriorly, and forward growth is accomplished by additions of bone on the surface of the alveolar process as the incisors develop and erupt. The backward growth of the maxilla actually is part of the forward growth process. This backward growth has made room for three molars, and this growth would close the pharynx if it were not for the pterygoid process behind the tuberosity which actually forces the maxilla forward as the tuberosity grows backward.

The growth in width of the maxilla is accomplished on most of the free surfaces by additions of bone to the body and alveolar process. This is accompanied by absorption of bone from the lingual side of the alveolar process and the lateral walls of the nares and antrum. The palate increases in width by additions of bone along the alveolar process between the maxilla and the palatal process.

Strang wrote:

Within the last few years considerable attention has been called to deformities of the dental arches caused by pressure from sleeping or sitting postures.

A very common habit among children is sleeping on their stomachs and pillowing one side of their face on the hand or forearm during sleep. This causes a lingual movement of the maxillary teeth on that side and lack of development of the maxilla on the same side. The mandible is affected less because it does not have a rigid attachment and it can slide away from the pressure. Another common habit among children is leaning on the hand when reading and resting the bulbous portion of the thumb against the maxillary premolars and molars and causing a lingual displacement of the teeth on the pressure side. Many children spend a good portion of their day leaning on the chin or the side of the face, causing pressure on the growing jaws. Some children are antisocial and others are not allowed to get out and romp and play with other children. Consequently, they spend a great part of their leisure time reading books with the pressure of the hand transmitted to the developing jaws. This is also very prevalent during the school hours, and if the child then sleeps on his stomach at night with the weight of the head

pressing on the hand or arm, it is reasonable to assume that such pressures would most certainly inhibit growth in these parts and would contribute toward malocclusion and distortion of the facial bones.

According to Macewen, "Freedom from undue pressure is one of the conditions necessary for active osteoblastic proliferation." In a previous paragraph on growth and development, it was pointed out that profuse osteoblastic activity is necessary for the growth of the jaws. This osteoblastic activity cannot occur on the lateral surfaces of the maxilla and mandible if fairly constant pressure is applied on these surfaces by habitually leaning and sleeping on them. Lateral growth is inhibited because the osteoblastic activity is inhibited and distortion of the maxilla and the mandible is accomplished by the stimulation of osteoclastic activity in accordance with Wolff's and Keith's laws of changes in bone.

We have already stated that the face increases in size twelve times from birth to adolescence, while the cranium increases only four times. It seems reasonable, therefore, that a ventral sleeper could inhibit that prolific growth. It is logical to assume that a chin leaner could inhibit that growth. If a child can create curvature of the spine by simply throwing his weight on one leg when tired, the same child could create distortion of the mandible by leaning on the chin because of a habit that he may have acquired during periods of fatigue.

The maxilla grows forward and downward, and a child leaning on his hand against the maxilla can cause pressure to be exerted in a posterolateral direction. This must cause some disturbance in the growth center where the tuberosity is "kicking" the entire maxilla forward using the pterygoid process as a buttress. Sleeping ventrally can do the same because the entire weight of the head is transferred to this growth center. Macewen stated, "Osteoblasts cannot proliferate unless there is freedom from undue pressure." What is undue pressure? Growth may be promoted in the maxilla and mandible with very light pressure. Conversely, the child may inhibit growth with the same pressures exerted against the growth centers. The pernicious pressures are many pounds while our treatment pressures are but a few ounces.

It appears that many children develop a leaning habit with the ball of the thumb against the upper first molars and the index finger pressing against the upper anterior incisor teeth. This pressure causes a lingual shifting of the maxillary molars and premolars and a lingual movement of the upper anterior teeth, resulting in a Class III malocclusion with a cross-bite on the pressure side. The buccal and labial osteoblasts which are forming new bone in these areas are forced to discontinue operation because they will not proliferate in these pressure areas. It seems evident, therefore, that these leaning habits in conjunction with bad sleeping habits, particularly if there is an inherent weakness in the dentofacial structures due to illness or dietary deficiencies, are one of the most common etiological factors in dentofacial anomalies.

Chin leaning will cause the bite to be closed if the pressure is exerted on the underside of the chin, and the writer has observed at least a dozen skulls which illustrate this deformity. The anterior one-half of these mandibles is

bent upward, graphically revealing the effects of this pressure. If these chin leaners exert the pressure on the side of the face, the arches will be collapsed inward. If the pressure is exerted on the tip of the chin, the growth centers on the coronoid process and on the posterior border of the ramus will be adversely affected, growth will be retarded, and pressure malformation of the mandible will result. By this it is not meant to imply that these dire conditions will result in dentofacial abnormalities in every child who sleeps on his stomach or leans on his chin.

Numerous children with pernicious leaning and sleeping habits possess a well-developed face and do not have malocclusion. How can these habits then cause facial abnormalities in other children whose habits are the same? It can be explained by a disturbance in ossification caused by ill health, improper diet, or endocrine disturbances resulting in "bone fatigue."

Krogman concluded that:

Face growth is expedited, retarded, warped or inhibited by general constitutional ill health or endocrine imbalance. The effect may be secondary rather than primary, as, for example, when allergy may temporarily enlarge adenoids and turbinates, leading to mouth habits productive of malocclusion. Further, the constitutional or endocrine disorders may cause a halisteresis or demineralization which will in the alveolar area defeat attempts at local adjustments.

Despite all interruptions, however, growth does tend to a structurally or functionally adequate whole. The increased growth velocity in the postillness periods repairs defective facial growth, though in severe cases it does not obliterate its existence. It is the tendency to perfection and repair that holds hope for orthodontists.

It is during these periods of growth interruptions that the greatest damage is done. These pernicious leaning and sleeping habits are with the child at all times. He undergoes a period of illness and the pressure habit causes the dentofacial structures to become warped because of the reduced mineral content of the bones. When calcification again becomes normal after this period of illness, these structures stay malformed. In cases of chronic halisteresis because of deficient diets, malnutrition, or endocrine disturbances, these pressure habits cause a continuous and chronic "warping" of these structures.

DEVELOPMENT OF THE MECHANISM FOR TAKING SLEEPING PICTURES OF CHILDREN AT PREDETERMINED INTERVALS DURING THE NIGHT

The writer became interested in postural and sleeping habits while he was a graduate student in the orthodontic department of the University of Southern California. The clinic was very active and there were many patients under treatment. Consequently, many children were awaiting their turn for treatment. Naturally they became immediately engrossed in the books and magazines available and assumed relaxed positions. Their resultant posture habits were generally very detrimental to the dentofacial structures. Despite constant efforts and vigilance on the part of the staff and students to break their habits, the majority of them persisted in reverting to these positions.

Dr. Spencer Atkinson insisted that many of the children were sleeping on their stomachs as well as leaning on their faces. He suggested that a camera

be devised which would take pictures of the sleeping postures of children. An alarm clock attachment was connected to an ordinary box flash camera. The alarm apparatus was taken out and a chain connected from the alarm key to the shutter release of the camera. The clock was set so that the alarm which would take a series of pictures during a single night.

The child took the apparatus home, set it on the night stand, and focused it on his pillow; then during the night the flash went off taking a picture of the child's sleeping posture. The next night he advanced the time one hour on the alarm adjustment, inserted another flash bulb, and during the night another picture was taken one hour later than the previous night. The following night another picture was taken also an hour later. This arrangement worked very well and the series of pictures of the first child showed him sleeping with his head pillowed on his arm in all three exposures. The author immediately became intrigued with the results of the first venture, and felt that the mechanical device could be improved. A device was needed which would take a series of pictures during a single night.

The requirements of the equipment were many; it must be fully automatic, easy to carry, easy to focus, and easily set up by the child. It must be so adjustable that it would be able to take a picture every half-hour during the night if so desired. In other words, the operation was to be so simple as to permit a child to carry the camera home, set it up, and return it to the office the next day with eight or sixteen exposures of his sleeping postures taken during the night. Many months were consumed on a plan which incorporated a complicated system of motors and gears to advance the film and trip the shutter. This plan had to be discarded because the equipment would be too bulky and heavy for the child to carry.

A search was then made for a Robot camera which would advance the film automatically after each exposure. Dr. Spencer Atkinson came to the rescue and kindly gave me a Robot camera which solved the problem. A timing device was made from an electric clock motor which activated the camera by means of a solenoid every hour during the night. An ordinary twenty-five-watt bulb was used in a reflector and so synchronized with the timing device that it came on for one and one-half seconds each time an exposure was made. In this way the child was not disturbed while sleeping and a time exposure was made every hour during the night. The film automatically advanced after the exposure was made; an hour later the timer activated the solenoid which turned the light on, opened the shutter on the camera for one and one-half seconds, turned the light off, closed the shutter, and advanced the film for the next exposure which was made an hour later and the same sequence was repeated.

The equipment was simple for the child to operate. A list of instructions was fastened to the inside of the carrying case which was an ordinary overnight bag. The total weight was about eight pounds. The child was instructed to remove the camera from the carrying case, place it on an end table five feet from his bed, and adjust the camera with the incorporated tilting device so that it was focused on his pillow, and lock it in that position. He was then instructed to plug it into an electrical outlet when he went to bed.

A series of pictures was made during the night, and in the morning the child unlocked the tilting table, put the device in the carrying case, and returned it to the office.

A roll of film had thirty-six exposures so that the camera could be sent home with two more patients before the film was removed and developed. In this manner the equipment was able to obtain a tremendous volume of data in a short while. The equipment is still to be improved. Some of the children informed me that it kept them awake during the night because of the buzzing noise created by the activation of the solenoids by the alternating current which is used in house circuits. The use of direct current obtained from flash-light batteries solved that problem because the polarity remained constant and the impulse did not relax and reactivate the magnet sixty times a second which occurred with the use of alternating current.

The children also complained that the light bothered them during the night. It is true that a twenty-five-watt bulb was used, but the reflector behind the bulb concentrated the light and reflected it in their faces. Because of these annoyances the children may not be as relaxed as they should be. The equipment is now being redesigned to eliminate both the noise and light, and the use of an infrared light in conjunction with infrared film will eliminate the lighting problem. Infrared light is invisible and will be used to expose the film; a more accurate study of sleeping postures will be possible because the subjects will be completely relaxed and sleeping normally without noise or light interference. The new equipment will also use a movie camera which will make an exposure every ten minutes, or more if desired.

MEANS OF AIDING THE PATIENT IN OVERCOMING SLEEPING POSITIONS

As in all human ailments, prevention is always easier than cure. Primitive tribes sleep children on their backs by the simple expedient of tying them down on a flat board or in a basketlike arrangement made of reeds. The purpose of this is to keep the child in a straight position which would hold the back and legs in alignment. This also automatically keeps the child from sleeping on his face. The skulls of primitive races show a flattening on the back of the head but the dentofacial structures are usually in good alignment and malocclusions are very rare in these people. This investigator has never offered such a simple solution to the parents of offending patients. The modern parents believe in rearing their children the hard way. Harvey Stallard devised a sleeping gown with lateral and lengthwise tie straps. The sleeves of the gown had buttonholes so that the arms of the child could be tied down also. This sleeping garment allowed the child to sleep on both sides and his back, but would not allow him to turn over on his stomach. Stallard reported:

It has been successful with children who will submit to its use, but many mothers will not submit to its use, because they think it is cruel, to which I have replied that I can think of nothing so cruel and inhuman as orthodontically harnessing up the teeth and moving them about only to let the treated case fail through negligence or by a return to pressure habits. I still believe that such a jacket is not as cruel as they suppose.

The easiest way of avoiding poor sleeping habits is to start the infant in a correct manner. The pediatricians will not cooperate with us in this matter because they are afraid that the back of the head will become flattened. They would rather flatten the facial structures and inhibit the growth of the face. The orthopedists and physical therapists, on the other hand, are beginning to recognize the deformities created by stomach sleeping of the infant. Doyle described how a physical therapist would sleep a baby:

Stated briefly, place a baby first on one side and then on the other, with a short relief period on his back in between. A constant watchfulness over the position which the baby may assume in the bassinet is required to make sure that no position is held too long, that crooked or otherwise unnatural positions are not allowed to develop and that he at all times is in correct body alignment.

In view of their background and special training, the logical person to take the initiative in educating parents along this line is the physical therapist.

Fitsburgh, another physical therapist, described a method of breaking poor sleeping postures in a child:

It is desirable to establish a habit of turning over during sleep in the interest of a uniform development of children's bodies. Sleeping habits are the hardest to change and require the most attention and persistence on the part of the parent. Just after a child is sound asleep it is possible to turn him without waking if the old habit is not too strong. Sleeping on the stomach is the hardest habit to break; even at two months of age it has been found impossible to break in certain infants without a battle which the average parent is not capable of waging.

If from first, an infant is placed on alternating sides for sleeping and on the back and stomach for waking hours the prenatal curves of back and legs straighten out in a few weeks in the majority of cases. It is necessary to spread the hands wide apart when placing the baby on his stomach for play in order to overcome the round shoulders which may accompany the side sleeping position. These children learn to turn themselves during sleep of their own accord and sleep in all positions with equal ease. Their perfect bodies are proof of the value of this early care.

The orthodontist's problem is to correct these habits at a later period in the child's life. The habit is so well established by the time the patient comes to us with dentofacial abnormalities that the sleeping posture is almost impossible to correct. The patient obviously while sleeping is unaware of his position. Therefore, he continues to sleep incorrectly and the parents cannot stay awake all night to turn the child over. The problem is almost insurmountable once the habit has become fixed in the patient's subconscious mind. The pediatrician has done his work well. The back of the child's skull is well formed and well developed. The child's face is deformed and he cannot chew his food properly to satisfy the crying need of the growing body. The face has attempted to grow twelve times its original size, and the pediatrician has told the mother to keep the child on his stomach. This amounts to about 95 per cent of the time during the first year of the child's life. The pediatrician has established a habit and the orthodontist not only has to correct the dentofacial malformation, but he also has to keep the child from sleeping and leaning on these structures or the face will again collapse. Some mechanical device must be used, and used consistently until the subconscious mind of the child has accepted a new habit and has discarded the old.

This writer uses a mechanical device which is slipped over the shoulders at night and fastens around the chest of the child. It has a strap made of rug binding encircling the chest, with three or four ordinary spools sewed on the front. The holes in the spools are used to sew the spools on the anterior portion of the strap. Shoulder straps are then sewed on the belt to keep it from slipping down. A waist belt may also be attached to keep it from slipping up during the night. The same results may be obtained by having the mother sew the spools on the chest of a tight-fitting sleeping garment.

The purpose of the spools is to cause pressure on the chest during the night if the child turns over on his stomach. The mothers report that this works fairly well in some cases. In those cases in which the habit is too strongly established to break in this manner, the mother is told to sew three large rubber tennis balls across the chest of the sleeping garment. The child will not sleep on this contrivance—it can only be hoped that the child wears the garment. An appliance of this sort presents the same problem to the orthodontist as is encountered when the American child is presented with a headcap to wear at night. We can only present the problem to the parents and ask their cooperation in insisting that the child do as he is told.

Dr. Jesse Linn of Los Angeles, devised an appliance which fastens to the child's wrists in such a manner that the child is prevented from turning over on his stomach during the night. It is fastened in such a way that it will hold securely and not come loose. The device will allow the child to sleep on his back and sides, but that is as far as he can go. The advantage of such a device is that the orthodontist knows that sleeping on the stomach is impossible when it is used and that the child is under complete control of the operator.

PRESENTATION OF A SERIES OF CASES WHICH HAVE UNDERGONE ORTHODONTIC
TREATMENT IN WHICH THE CHIEF ETIOLOGICAL FACTOR OF THE MAL-
OCCLUSION WAS AN ABNORMAL SLEEPING POSTURE

Figs. 1 and 2, Plate I, show the original photographic equipment, composed of an alarm clock and a flash camera, which took one exposure each night. Fig. 1 shows the back of the camera and how it was mounted very simply on a board. Fig. 2 shows the front of the camera and the manner in which it was attached with a chain to the alarm clock. When the alarm was set for a certain hour, the chain was pulled by the turning alarm key on the clock, and this tripped the shutter of the camera and a flash picture was taken. The weakness of this arrangement was that only one picture could be taken in one night.

Fig. 3 shows the front portion of the automatic equipment. Fig. 4 is the rear view showing the adjustable tilting table and how simply it may be locked into position with two thumbscrews after the child has focused the camera on his or her pillow. The child then plugs it into an electrical outlet, goes to bed, and photographs are taken every hour throughout the night. Fig. 5 shows the equipment in the carrying case ready to be taken home by the patient.

Plate II is a composite study of the facial structures, models of the teeth and dental arches, and the sleeping postures of a patient for three suc-

ceeding nights, taken with the box camera and alarm clock arrangement. Fig. 1 shows an asymmetrical face with the right side, including the ear, more flattened than the left side, which leads to the suspicion that he sleeps on the right side most of the time. Figs. 9 and 10 show the patient on his right side, confirming this suspicion. Fig. 2 shows a deep overbite caused by consistent chin leaning during the day. In Figs. 3 and 6 the maxillary 12-year molars are erupting laterally to the line of occlusion, more so on the right side, because as yet the sleeping pressures have not pushed them medially. In Figs. 5

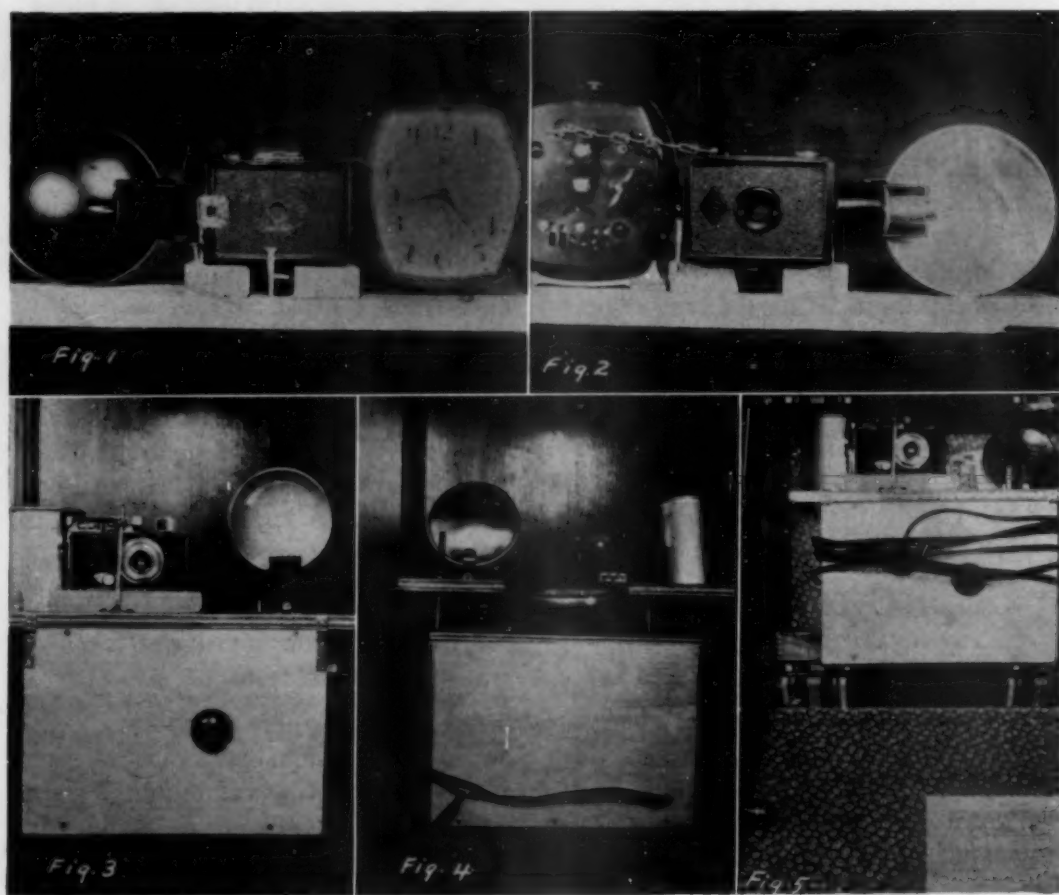


Plate I. Equipment used in obtaining photographs of patients at predetermined intervals throughout the night.

and 7 the dental arches are contracted to a considerable degree, especially on the right side, causing the resulting malocclusion. Fig. 4 shows an underdevelopment of the mandible which was also caused by his daytime chin leaning habits. His sleeping postures as seen in Figs. 8, 9, and 10 denote that the full weight of his head is resting on his hand, or arm, and pushing against the maxilla and the mandible, which pressures are at least twelve pounds. These pressures are being exerted every night, in his case probably all night, because each photograph was taken an hour later for three succeeding nights. When the photographic evidence of his pillowing habits is compared to the

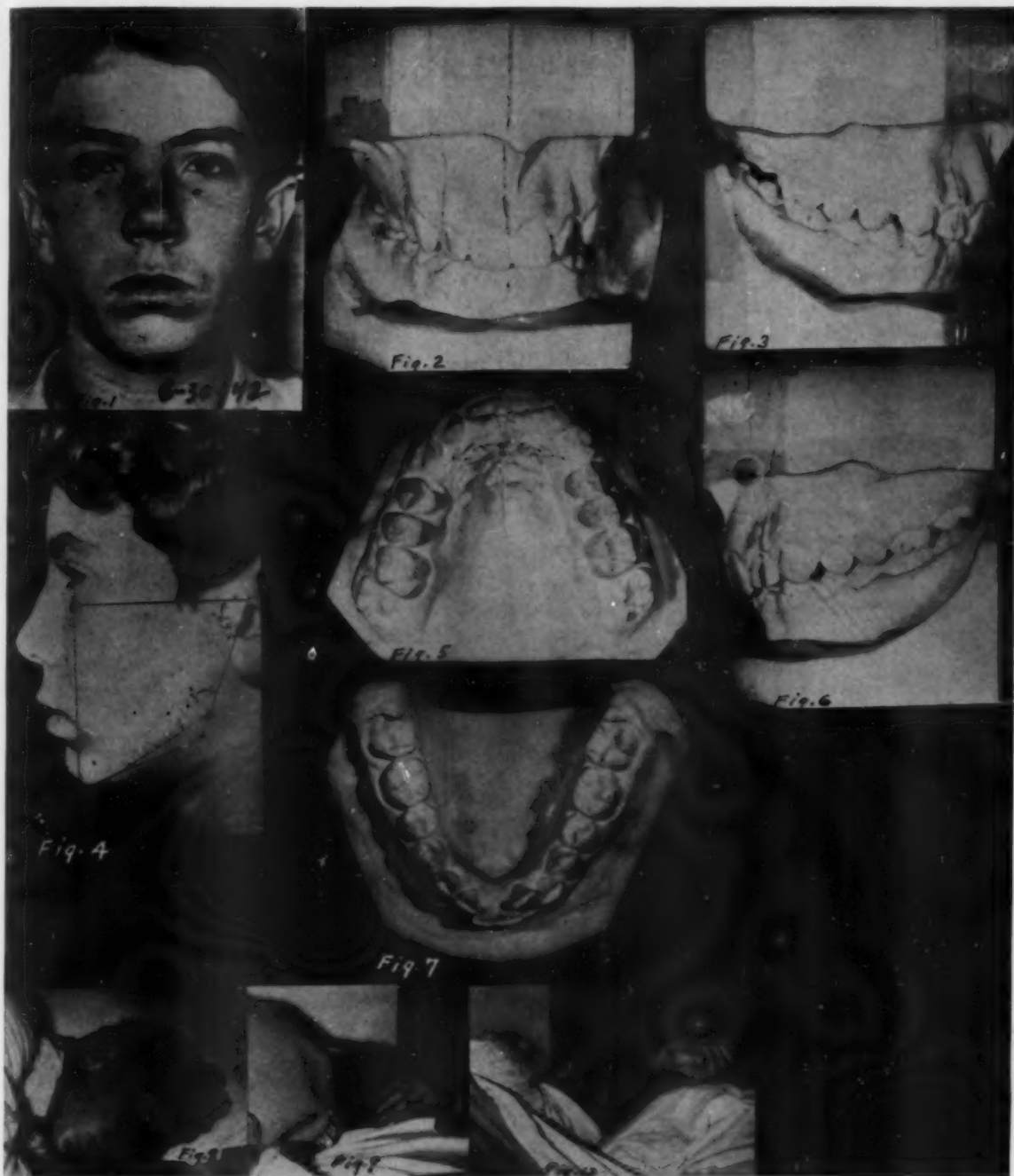


Plate II. Sleeping photographs taken with box camera and alarm clock arrangement for three succeeding nights.

type of malocclusion shown in Figs. 5 and 7, it is not difficult to realize that his sleeping posture was a potent determining factor in his case.

His treatment consisted of a full-banded universal appliance exerting about three ounces of pressure. He and his parents were told that he must sleep on his back in the future or his treatment might not be successful. The parents and the patient were informed that his head weighs approximately twelve pounds and that the treatment pressures were only three ounces. The treatment period was eighteen months, and enough lateral development of the maxillary and mandibular arches was attained to align the teeth properly and correct the closed bite.

Plate III illustrates a case of bimaxillary contraction in which the maxillary second premolars had been pushed across the mandibular line of occlusion due to pressure from sleeping on her hand.

Figs. 1, 4, and 8 are the frontal and profile facial photographs of a 14-year-old girl with bimaxillary contracted dental arches. The chief etiological factor in her malocclusion was face pillowing. Figs. 9, 10, 12, 13, and 14 show her sleeping on her side and pillowing her face on her hand or arm, inhibiting normal growth of her dental and facial structures as well as pushing her teeth into malocclusion. Figs. 11, 15, and 16 show her on her back, which is a proper sleeping position; however, almost two-thirds of the night is spent exerting pressures against her facial structures, which is more than sufficient to be harmful.

The study models in Figs. 2, 5, and 7 show a very crowded condition of the teeth caused by the narrow dental arches; this does not permit enough room for the normal alignment of the teeth. Figs. 3 and 6 show the right and left second maxillary premolars in cross-bite, which is very easily understood after a careful study of Fig. 12. This shows the knuckles of her hand pushing against the maxillary premolar region and pushing the second premolars across the mandibular line of occlusion. The knuckles of her hand, after a few years of such pressure, now fit the irregularities of her maxillary teeth very nicely.

Treatment for this patient consisted of attaining enough lateral development by means of a maxillary and mandibular split lingual appliance. Both lingual arch wires were split in the anterior region and each end inserted into a round tube. A coil spring then activated the lingual arch in a lateral direction, exerting about three ounces of pressure. When enough lateral development was attained, the teeth were then brought into alignment by means of a full-banded universal appliance.

One of the most difficult cases which this writer has been called on to correct is shown in Plate IV. This girl was treated for eighteen months with intermaxillary elastics in an effort to stimulate a forward growth of the mandible, with negligible results as shown in Fig. 8. Figs. 1 and 6 show an otherwise well-proportioned and attractive face except for the two lateral incisors which appear to be protruding. Figs. 2 and 4 also reveal the seemingly protruding lateral teeth, but a close study of the upper lip in Fig. 8 shows it to be in a correct position for a nice profile. Careful scrutiny of the orbital line in



Plate III. Bimaxillary contraction with maxillary second premolars crossed over the mandibular line of occlusion due to pressure from sleeping on her hand.

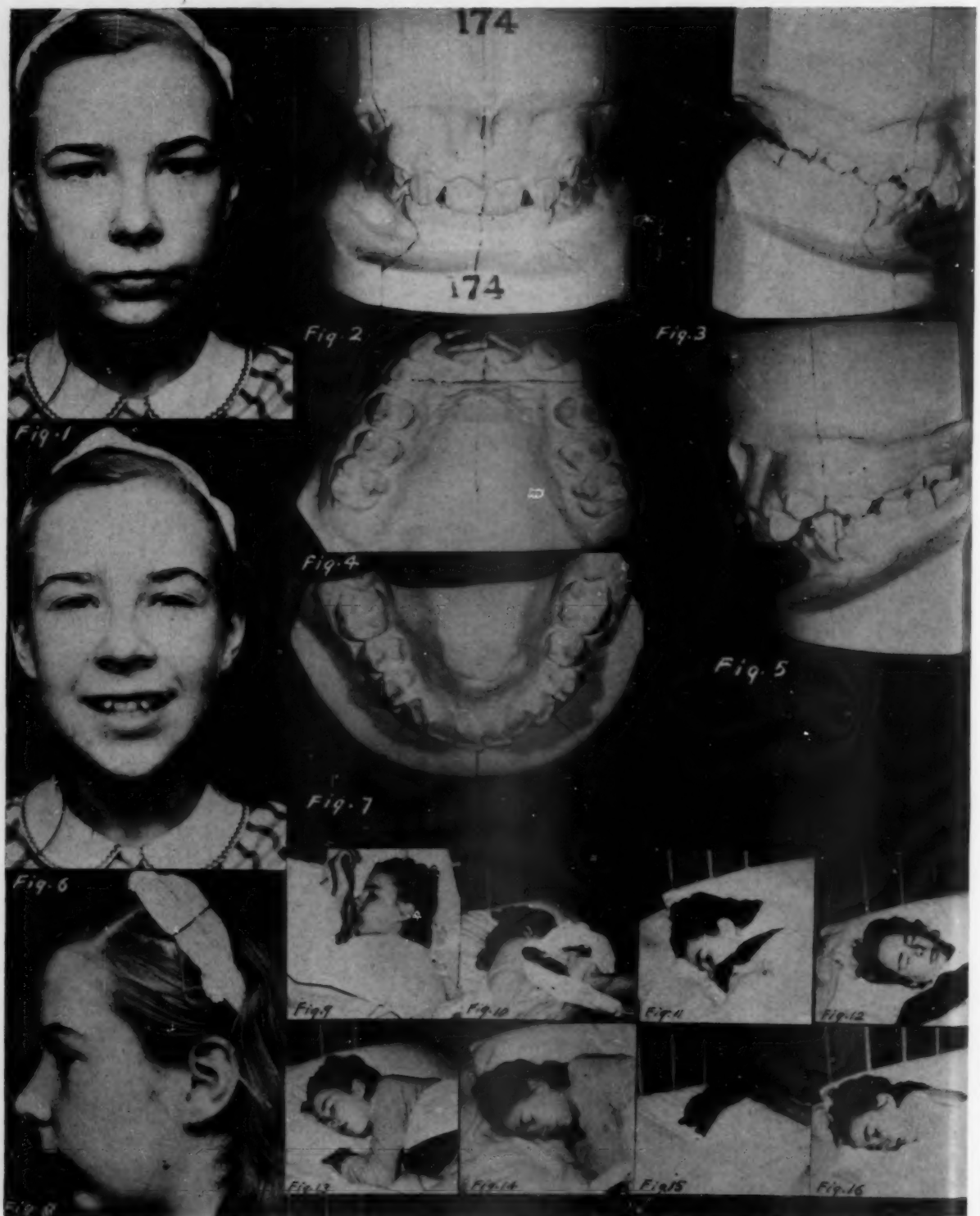


Plate IV. Poor leaning and sleeping postures delayed completion of treatment in this case for eighteen months.

Figs. 2, 3, and 5 reveals that the cuspids, after they have fully erupted, will be approximately in their correct position. The maxillary molar relationship as seen in Figs. 3 and 5 is a full cusp forward, and Fig. 2 reveals an extreme close-bite in the anterior region. The two maxillary central incisors have been pushed distally, locking the mandible in a retruded position. The mandibular teeth as seen in Fig. 7 are in good alignment except where the lower central incisors have been pushed upward due to chronic chin leaning habits.

The patient leaned on her chin constantly while in the office, and at the same time she had a habit of pressing on her central incisors with her index finger. She also admitted to leaning on her chin for considerable periods of time at school and at home. The automatic night camera was sent home with her, and the results show her sleeping on her face for seven hours during the night. Fig. 9 reveals her sleeping on her hand in such a manner as to push the maxillary central incisors distally. Fig. 14 shows her arm under her chin, and she may be sleeping on her arm in Figs. 10, 11, and 15. Figs. 9, 10, 11, 13, 14, 15, and 16 all show poor sleeping postures in which she is exerting pressure against her dentofacial structures. Fig. 12 is the only photograph in which pressure is not being exerted against her face.

She was a conscientious child and very anxious to cooperate in the correction of her malocclusion and facial deformity. Her promise to keep all pressures away from her face and sleep on her back was faithfully kept because it was not necessary to bring the matter to her attention again. The case then responded very nicely. Her malocclusion was corrected eighteen months later, and a satisfactory anterior development of the mandible was achieved.

The pretty little girl shown in Plate V had many etiological factors which were the determining causes of her dentofacial abnormality. She was an inveterate chin leaner, mouth breather, lip licker, and face sleeper. She had a maxillary anterior dental protraction due to the lip licking and mouth breathing habits. Figs. 2 and 4 illustrate the forward drifting and the spacing of the maxillary incisors due to her mouth breathing and constant wetting of her lips with her tongue. The mouth breathing allowed the musculature of the mouth to relax, the teeth drifted anteriorly, and the lip licking thrust them farther forward due to the action of the tongue.

The orbital line passes through the tip of the cuspids as shown in Figs. 3, 4, and 5, which indicates that the position of the maxillary molars and premolars is correct; however, she has a Class II molar relationship as is seen in Figs. 3 and 5. Without orientated models the operator, after studying Figs. 3 and 5, would assume that the entire maxilla was too far forward. After observing Fig. 6 it is seen that the upper lip position is good and that the orbital line passes through the corner of the mouth and tip of the cuspid; it is then realized that the mandible must be deficient in its normal development.

Fig. 1 also shows a deficiency in the lower third of the face. Fig. 7 shows the mandibular teeth in fair alignment except for a deep overbite shown in Fig. 2 in which the lower anterior teeth cannot be seen because the mandible has been bent upward in the anterior region caused by her chin leaning and

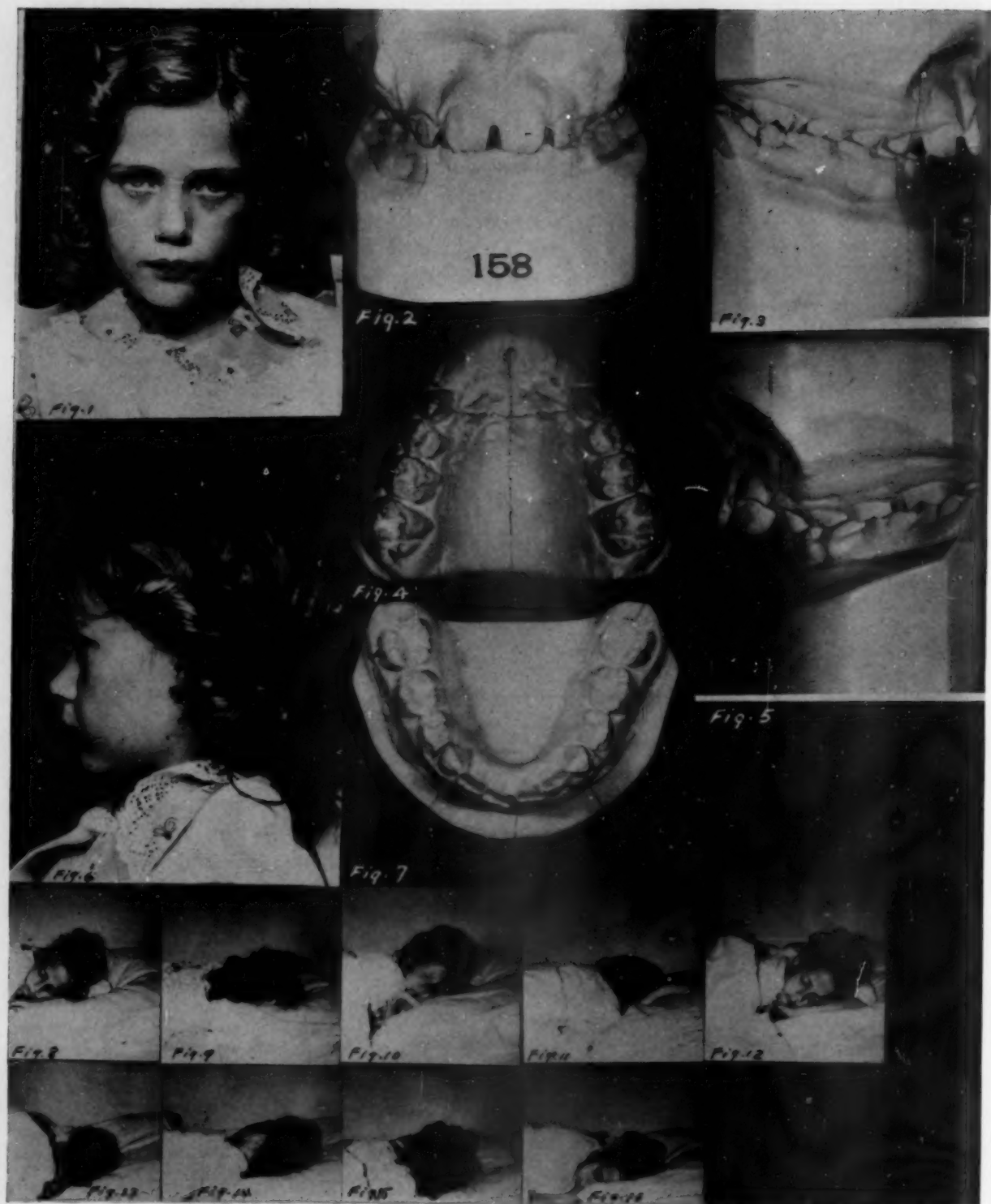


Plate V. Eight hours of sleeping on her face and arm was a potent etiological factor in her dentofacial abnormality.

face pillowing habits. The mandibular incisors were biting into the palatal soft tissues, and the patient was extremely uncomfortable because of the resulting trauma.

Both of her dental arches were contracted because of her sleeping postures in which she is exerting pressures against her face in eight of her nine sleeping pictures. Figs 8, 9, 10, 11, 12, 13, 15, and 16 show her sleeping on her face, and Figs. 8, 10, 12, and 16 show her pillowing her face on her arm or hand, which exerts an even greater localized pressure against the jaws and teeth. Fig. 14 is the only photograph which shows the patient on her back at any time during the night.

This child's prognosis was obscure for the first eighteen months of treatment because she was very uncooperative and would not discontinue her bad pressure habits. She was finally convinced that unless she did her part and discontinued these habits, her treatment would be unsuccessful. When she realized that her cooperation was essential for success, her orthodontic treatment began to be effective, and treatment was completed eighteen months later.

SUMMARY AND CONCLUSIONS

Poor sleeping postures do not always lead to dentofacial abnormalities. There are probably numerous American children who are stomach sleepers, but they do not all have malocclusions; the problem goes much farther than stomach sleeping. This writer has attempted to show that osseous structures will respond to pressure stimulation. All previous investigators in this field have found this to be true. Their findings show that these pressures do not have to be continuous. Bone will and does change with intermittent pressures because the osteoclasts and osteoblasts keep working after the pressure has been removed. This has been shown by Oppenheim and other investigators. The bone cells keep working as long as at least four days, which means that light physiologic pressures applied for twelve hours a day will create osteoclastic activity for at least four days with no further stimulation needed. Ziebe, Mershon, and Brodie have all written to this effect. Orban said, "Resorption of bone can continue for months."

There can be no question but that many other etiological factors may enter the picture. The child may sleep on his stomach only a few hours during the night and he may lean on his chin a few hours during the day. This may total eight or ten hours a day, which is enough time for the osteoblasts and the osteoclasts to proliferate and promote osseous changes in the dentofacial structures. If sleeping on the back causes a flattening of the large, thick cranial bones of the skull, which ossify at an early age, it is only reasonable to assume that the same applies to the face, which grows three times faster than the cranium. The face was not designed to protect the brain from injury as was the cranium. It grows rapidly and the skull slowly, and yet the back of the cranium becomes flattened from sleeping on it. This is generally conceded; therefore, it should be generally concluded that all pressures should be kept from the face.

Many other etiological factors in conjunction with these pressure habits may enter the final picture of malformation. Let it be assumed that the child was indulging in pressure habits, but the bone was strong enough and hard enough due to good calcification and good health to withstand these pressures. Then illness struck and the child became weakened, the minerals were taken from the bones to supply the soft tissues, and in a few days the pressures began to mold the bones in their new position. The illness was of long duration and consequently the chain of etiological factors led to gross malformation of a once perfect bone picture.

Hypothyroidism, scurvy, rickets, malnutrition, and other endocrine disturbances are all highly potent etiological factors which, in conjunction with pernicious sleeping and leaning habits, are, in this essayist's opinion, among the most important contributing factors in dentofacial anomalies and will cause a relapse in our finished cases unless these conditions are eliminated.

Over four hundred sleeping photographs, taken by the author, of forty-five children have shown conclusively that over 50 per cent of these children who are having orthodontic treatment are exerting pressures against their prolifically growing facial structures for at least 50 per cent of their sleeping period. These same children have been watched carefully in the office, and most of them, during periods of relaxation, have been observed in poor postural positions exerting pressures against these same structures.

It has been shown that continuous pressure is not necessary to cause changes in bone structure; intermittent pressures are sufficient to bring about these changes.

In presenting this series of cases, the investigator is fully aware that many other factors may be involved in the etiology of these malocclusions, such as endocrine disturbances, hereditary factors, periods of ill health resulting in impaired growth and development, improper diets, and rickets. However, it is this writer's contention that with the visual evidence presented in this paper it is logical to assume that if the bone structures of the face are subjected to pressures during most of the night, the growth centers certainly must be adversely affected. Orthodontic treatment pressures are much smaller than the pressures being subjected to these faces during their sleeping periods; consequently, these pressures must be harmful and should be eliminated before the chronic unresponsive case is given up as hopeless.

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727 WEST SEVENTH STREET.

SLIDING SLEEVE ATTACHMENT

HOWARD YOST, D.D.S., GRAND ISLAND, NEB.

FIG. 1 is a schematic drawing of twin anterior labial wire with end tube sections showing round sliding sleeve tubes to engage in 0.030 inch open tubes for incisor and cuspid bands. Sliding sleeves are 0.022 inch inside diameter and 0.030 inch outside diameter. The sliding sleeve is 2.8 mm. long or the same length as the open tube. The sleeve is inserted into the open tube from the end of the open tube. A slight pinch of the open tube after the sleeve has been inserted insures adequate friction to hold the sleeve in the open tube. When coil spring, 0.0056 inch wound to 0.020 inch inside diameter, is used on twin section, the coil spring will engage against the end of the open tube and not push the sleeve beyond the open tube.

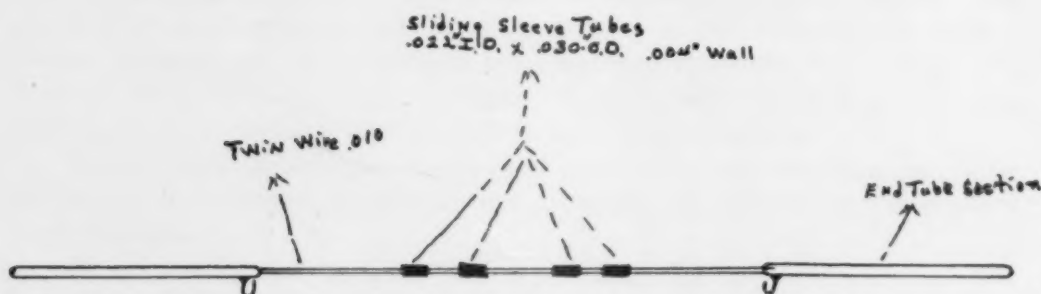


Fig. 1.

The advantage is that when the arch wire is disengaged from the open tubes on bands by sliding the sleeves out, they remain on twin section, facilitating easy replacement.

Tubing 0.022 inch inside diameter by 0.030 inch outside diameter with 0.004 inch wall, may be obtained from Vita Needle Company, Needham, Massachusetts.

It is hoped an oval open tube 0.019 inch by 0.030 inch inside diameter may soon be manufactured to receive an oval sliding sleeve 0.011 inch by 0.022 inch inside diameter with an 0.004 inch wall. This would reduce the labial thickness of the attachment 0.011 inch and provide for greater refinement in design.

FIRST NATIONAL BANK BUILDING.

In Memoriam

WILLIAM HERNDON PEARSON

1877-1949

WILLIAM HERNDON PEARSON was born Sept. 11, 1877, in Hanover County, Virginia, the son of Charles Grandison Pearson, a Hanover County merchant and farmer, and Celia Anna King Pearson.

He received his early education from a tutor and at the Southside Academy in Richmond. He attended the College of William and Mary, and in 1899 received a degree in dentistry from the University College of Medicine at Richmond, now the Medical College of Virginia.

Dr. Pearson began the practice of dentistry at Hampton, Virginia, in 1900. Deciding to specialize in the correction of dental deformities, he graduated from the Angle School of Orthodontia at New London, Connecticut, and came to Norfolk in 1911 to begin the practice of his specialty and to be the first man in the state of Virginia to limit his practice to orthodontics. He later supplemented his training with postgraduate study at New London, Connecticut, and the University of Southern California. He was certified by the American Board of Orthodontics in 1941.

As an authority in his field, the Department of Pediatrics at the University of Virginia, Charlottesville, asked him to deliver lectures in preventive orthodontics. These lectures were started for the purpose of creating among physicians a consciousness of the facial deformities seen in an orthodontic practice; and for a period of twenty years Dr. Pearson commuted to Charlottesville every two weeks.

He served terms as president of the Eastern Association of Graduates of the Angle School, the Virginia State Dental Association, and held membership also in the American Association of Orthodontists, the New York Society of Orthodontists, the American Dental Association, the Tidewater Dental Association, and was organizer of the Seaboard Dental Study Club; he belonged to the Rotary Club and was an active worker in the religious and civic life of Norfolk.

Dr. Pearson is survived by his wife, Mrs. Anne Segar Pearson, five sons, Dr. Charles Grandison Pearson, of the medical staff of the University of Virginia Hospital and the Blue Ridge Sanatorium, Charlottesville, William Herndon Pearson, Jr., John Yeardley Pearson, Richmond Simkins Pearson, and Robert Bacon Pearson, all of Norfolk, two brothers, Charles P. Pearson and Julian Bernard Pearson, both of Atlee, five grandsons, and three granddaughters.

Dr. Pearson was in declining health for a year but had continued active in his practice until two weeks before his death on May 20, 1949.

Department of Orthodontic Abstracts and Reviews

Edited by

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The Cranio-Facial Fragment of *Australopithecus Prometheus*: By Raymond A. Dart, *Am. J. Phys. Anthropol.*, n.s., 7: 187-211, June, 1949.

Following the discovery of the adult, probably female occiput of *Australopithecus prometheus* (Dart, 1948a) by Mr. James Kitching in September, 1947, the systematic sorting and sieving of the Makapansgat Limeworks dump, initiated by Mr. A. R. Hughes of the Department of Anatomy, yielded in July, 1948, an adolescent male mandible (Dart, 1948b). Because of this success the Committee of the Bernard Price Foundation for Palaeontological Research caused the July field work to be resumed during September and October, 1948. About 10 tons of fossil-bearing breccia, retrieved from the 600 tons sorted, were transported to Johannesburg during this time; from it some isolated australopithecine teeth and pelvic fragments have been recovered, as well as the bones of other fossils.

During the process of sorting in the field, Mr. Hughes discovered during September, 1948, the isolated and warped right parietal bone of an australopithecine infant overlying a cast of its endocranial surface. He also laid aside another piece of breccia carrying the imprints of teeth. Toward the end of October, 1948, Mr. Ben Kitching, who was assisting him, encountered the craniofacial fragment of an adult australopithecine skull which forms the main subject of this communication. It was then found by Mr. Hughes that the breccial fragment exhibiting dental impressions fitted the outer aspect of the craniofacial fragment perfectly. By casting the interval between the breccia and the broken lateral aspect of the maxilla, Mr. B. J. Grobbelaar, Laboratory Assistant in the Department of Anatomy, was able to restore the contour of the lost fragment of the broken first premolar, as well as the upward sweep of the broken maxilla, and so to furnish accurate information about the form of the upper jaw and width of the face. After the return to Johannesburg two australopithecine teeth (isolated) were found in the breccia: a worn left lower permanent third molar and a right lower deciduous second molar.

The most striking dental feature in which primitive human types, such as *Sinanthropus*, resemble the anthropoids, especially the gorilla and the orang, is the much larger size of the teeth in the male sex. The dentition and the state of its attrition show that this craniofacial fragment belonged to an adult individual, and from the comparative tables of cranial and dental measurements set forth it appears to have been a female. To judge from its proximity in the dump, it came from the same individual that furnished the occiput mentioned previously and upon which the type of *Australopithecus prometheus* was originally based.

Although a great increase occurs in the anteroposterior length of the palate during growth, it is remarkable that the distance between a vertical plane passing behind the first permanent molars and a similar plane passing in front of the incisors in *A. africanus* is 44 mm. while the corresponding distance in the adult *A. prometheus* could not have been more than 42 mm. Thus, in its general facial proportions the adult female *A. prometheus* retains in a remarkable degree those characteristics of the juvenile Taungs specimen. There is the same type of flattened face due to the depressed interorbital region (which is characteristic also of the living Bushman) and a scarcely more marked "canine" ridge of bone running down on either side of the face to ensheath the sockets of these teeth.

From this anterior aspect the maxilla is seen to be broad and flat, but much less so than in *Paranthropus* and *Plesianthropus*.

In facial height also, the promethean female form from Makapansgat assumes a virtually intermediate position between the Taungs child and the Kromdraai adult male. There is clearly an intimate relationship between the specimens from Taungs, Makapansgat, and Kromdraai in their general facial proportions; they form a tolerably coherent growth series, indicating that the degree of sexual divergence in the australopithecine group as a whole was approximately half of that between the 5-year-old child and the adult male.

Relative to its breadth and length, however, the promethean female palate, by retaining the same depth as that of *Paranthropus* (9 mm. is somewhat deeper than that of other australopithecines), a distinct groove for the greater palatine vessels and nerve creates a slight rugosity of the inferior surface of the maxilla.

Seen from the lateral aspect, the specimen reveals the reduced prognathism of this australopithecine type. In this respect it also approximates *Paranthropus*. The frontal bones do not approximate the maxillae in the medial wall of the orbit in australopithecine types, as commonly occurs in the chimpanzee and gorilla.

Posterior to the facial fragment there can be seen the shattered sphenoidal bone exposing, below the fracture, part of the lateral pterygoid plate and, above the fracture, the middle cranial fossa with the superior orbital fissure and foramen rotundum in its posteromedial angle. The line of section shows how the forward expansion of the temporosphenoidal lobe of the brain has bellied the great wing of the sphenoid anteriorly underneath the sharp margin formed by its anterosuperior border and the posterior margin of the small wing of the sphenoid, just lateral and superior to the superior orbital fissure. In these respects also *A. prometheus* corroborates for the australopithecine group the claims set forth by Broom (1947b) relative to *Plesianthropus*.

The anatomical features just described can be corroborated from this aspect, save that the overlying ala completely excludes the superior orbital fissure from view. Very little of the sphenoidal bone is preserved, but we are fortunate in having an appreciable fragment of the great wing and the lateral part of the sutural relationship of the small with the orbital plate of the frontal bone.

This suture, owing to the expansion backward and increased flattening of the orbital plate, runs laterally almost at right angles to the sagittal plane. The arrangement resembles that in the chimpanzee, and it is possible, but improbable, that the two orbital plates of the frontal bone met behind the cribriform plate of the ethmoid bone. The shattering of the skull caused it to fracture toward the cribriform fossa in this region, and the fracture probably followed the medial half of the frontosphenoidal suture. But it is not clear in this case, as it seems to have been in *Plesianthropus* (Broom, 1947b),

that the frontals are widely separated behind the cribriform plate: a younger specimen is required to settle the issue.

For the rest the endocranial topography is very similar to that found in *Plesianthropus*. The olfactory fossa (15 by 7 mm.) is long and narrow as compared with that of a female orang (13 by 10 mm.) in the Department of Anatomy. The ridge of the crista galli, which bisects the fossa longitudinally, is 4 to 5 mm. high. The line of the crista galli is continued forward and upward, deviating somewhat to the right of the sagittal plane, into a prominent median crest for the attachment of the falx cerebri. There is no foramen caecum, but emerging from the anterolateral part of the cribriform fossa on either side is a well-marked groove for an anterior meningeal branch of the anterior ethmoidal artery.

The carinated portion of the endocranial cast of the anterior cerebral fossa is at least 15 mm. deep and about 30 mm. broad. According to Broom's (1947b) diagram, the carinated portion of the *Plesianthropus* endocranial cast constituted a third of the width of the anterior cerebral fossa. If the same relationship held true for *A. prometheus*, the total width of the fossa was about 90 mm. as compared with 80 mm. for *Plesianthropus*. It may be recalled that Schepers (1946) in his table of measurements (*op. cit.*, p. 242) gives the frontal width of the endocranial cast in *Plesianthropus* as not greater than that of the chimpanzee (79 mm.), and in *Paranthropus* as 80 mm. His horizontal contour tracings, however, ascribe a maximal frontal width of nearly 80 mm. to *Plesianthropus* and approximately 90 mm. to *Paranthropus*. The contours seem to accord more closely with the facts brought to light by the more recent discoveries of the entire cranium of *Plesianthropus* and the cranial parts of *A. prometheus*. At any rate, the endocranial volume indicated by this anterior fragment corresponds with that suggested by the occiput (650 cm.) previously described.

The next effect of these modifications of the first molar morphology in *A. prometheus* is that the tooth, being thrown slightly out of square, is somewhat rhomboidal, the diagonals measuring 13.0 mm. and 15.0 mm., respectively, the anterolateral-posteromedial diagonal being the greater. In *Sinanthropus* the ordinarily rectangular form of the first and second upper molars is replaced in some cases by a more rhomboidal figure such as appears in *A. prometheus*. The gorilla, orang, and chimpanzee also occasionally exhibit the same feature.

There were found in the breccia during its development in Johannesburg two further isolated teeth, viz.: an unworn right second lower deciduous molar (probably male) and a worn left third permanent molar (probably female).

The well-worn second lower deciduous molar of *A. prometheus* was still present in the adolescent mandible which formed the subject of a previous communication to this journal (Dart, 1948b). It was then pointed out that "the 5-cusped second milk molar of *A. prometheus* (12.5 × 10.5 mm.) is somewhat larger than either that of *A. africanus* (11.7 × 10.7 mm.) *Plesianthropus* (11.0 × 9.0 mm.) or *Paranthropus* (12.0 × 9.7 mm.)."

Weidenreich (1937), in his monumental work on the *Sinanthropus* dentition, commented (*Am. J. Phys. Anthropol.* 1: 119) on the surprising similarity of the *A. africanus* m₂, despite its state of wear, to that of *Sinanthropus*, and the close relationship demonstrated thereby between these two forms. His remarks are even more specifically corroborated by this tooth of *A. prometheus*. Another effect of this exuberant enamel folding is to maintain the anterointernal cusp (metaconid) in characteristic broad contact with the intermediate-lateral cusp (hypoconid) at the central (or anteroposterior) furrow and the consequent

X-shaped disposition of the anteroposterior and transverse furrows of the tooth reminiscent of the dryopithecine arrangement.

The transverse furrow between the anteroexternal cusps (protoconid) and intermediate-lateral cusp (hypoconid) and the diagonal furrow between the hypoconid and the posterolateral (or fifth) cusp (mesoconid or hypoconulid) incise the lateral margin of the tooth deeply. As in the permanent molars the transverse furrow is seen to end in a pit, which is continued forward into a cingular furrow bounded below by an appreciable "cingular" ridging of the enamel on the anterolateral aspect of the tooth. There is therefore little doubt from the exactitude of the comparisons to be drawn between this tooth and the worn second right deciduous molar previously described on the one hand, and the permanent molars in the same adolescent male mandible on the other hand, that we are confronted here with the tooth of a second and younger male *A. prometheus*. It may have belonged to the infant a portion of whose isolated right parietal was found by Mr. Hughes in the same season's work.

The state of attrition in the specimen, as well as its size (14.0 by 14.0 mm.), suggests that it came from an adult female of the same age as the craniofacial fragment and probably from the same individual.

The third lower permanent molar has the typical 5-cusped pattern of the *A. prometheus* first and second lower molars, as opposed to the 6-cusped pattern exhibited by the third lower molar of *Plesianthropus*. It therefore approximates more closely the 5-cusped pattern also shown by the *Paranthropus* third lower molar. It retains evidence of the same tendency toward the formation of an extra cuspule between the two lingual cusps, which we have seen in the deciduous second molar and in the permanent molars of the adolescent previously described: a tendency which was even better displayed also by the second milk molar and the permanent molars of *Paranthropus* and is probably seen in its fully developed form in the 6-cusped molar of *Plesianthropus*. The same sort of accessory cuspal development between the two main buccal cusps occurred frequently in the molars of *Sinanthropus*, which incidentally display a great variety of cuspal wrinkling.

There is no trace left of an anterior fovea, nor its boundaries, nor of a carabelliform indentation and tubercle (such as occurred on the first and second lower molars of the adolescent type) on the anteroexternal cusp. The transverse furrow behind the two anterior cusps is just visible: like the diagonal sulcus it indented the buccal aspect of the tooth deeply, but, except for the width of the protoconid, betrays little evidence of the lateral pitting which probably characterized it. In contradistinction to the first and second lower molars of the adolescent *A. prometheus*, this third lower molar in the female *A. prometheus* exhibits a pronounced pitlike posterior fovea bounded by a posterior enamel crest, which apparently originally displayed a sixth cuspule.

The close anatomical correspondence between the two groups is corroborated mathematically when we find: (1) that the sexual divergence in dental size is scarcely if at all greater in the australopithecine than in the sinanthropine group; (2) that some australopithecine teeth can be smaller than some corresponding sinanthropine teeth; (3) that the excess in size of the smallest (female) australopithecine teeth over the largest (male) corresponding sinanthropine teeth is scarcely, if at all, greater than the difference in size between the largest (male) and smallest (female) sinanthropine teeth themselves. Actually, of course, the australopithecine teeth are larger, some almost rivaling those of the gorilla in size; and because of their size the adult australopithecine palate is a centimeter or more longer than the *sinanthropus* (or Neanderthal) palate. Meanwhile, owing to the broadening of the human skull, the *sinanthropus* (or Neanderthal) palate is a centimeter or more wider than the australopithecine palate.

When describing the dentition displayed by the adolescent *A. prometheus* mandible, I pointed out the generally more square form of the molar teeth and their closer approximation than other australopithecines in this respect to the human dentition. Their cusp pattern is also intermediate in some respects between those of *Plesianthropus* and *Paranthropus*. But the premolar pattern, especially that of the second premolars, was closer than that of either *Plesianthropus* or *Paranthropus* to the premolar pattern of mankind.

The annectant indications based upon the young male dentition of *A. prometheus* are corroborated by the dentition of this middle-aged female. The permanent upper molar-premolar morphology is closer to that of *Plesianthropus*; the deciduous lower molar and permanent lower molar morphology is intermediate between that of *Plesianthropus* and *Paranthropus* but closer on the whole to that of *Paranthropus*. The premolars are smaller and more humanoid teeth than those of *Plesianthropus* or *Paranthropus*; the molars also are smaller, more "square," and more humanoid. In point of fact, the first upper molar (12.0 by 12.5 mm.) is not larger by as much as a millimeter in either dimension than the first molars of Neanderthal types; and the second upper molar (14.0 by 13.0 mm.) scarcely exceeds Neanderthal types by more than 2 mm. in either dimension. This range of divergence between the molar teeth of *A. prometheus* and those of human beings is not greater than that exhibited between *A. prometheus* and other australopithecines.

Of course, it is doubtful whether sheer size of teeth has any deep significance. In terms of dental size alone, chimpanzee molars come closer to man than do those even of *A. prometheus*. It is the human pattern of the molar and premolar teeth, as Weidenreich pointed out (1937), that affiliates them with human teeth. Their intermediacy in terms of size as well as pattern allows the teeth in *A. prometheus* to bridge the gap between those of man and the other australopithecines, at the same time as that intermediacy links the other australopithecines to *A. prometheus* in a single closely affiliated group.

DISCUSSION

In describing the adult female teeth, features were found that linked *A. prometheus* both to *Plesianthropus* and to *Paranthropus*; but on the whole its dental characters, like the majority of its cranial and facial features, relate *A. prometheus* more closely to *Paranthropus* than to *Plesianthropus*. The brain of *Paranthropus* (650 cm.) is very appreciably larger than that of *Plesianthropus* (450 cm.); the foramen magnum is farther forward in *Paranthropus* than in *Plesianthropus*. The base of the skull differs correspondingly in the two forms; so *Paranthropus* probably held the head more erectly than *Plesianthropus* (Broom and Schepers, 1946).

The occiput of *A. prometheus*, which probably came from the same adult female individual, shows that *A. prometheus* held the head even more erectly than *Paranthropus*, *Pithecanthropus*, or *Sinanthropus*. It also demonstrates that the brain volume was as great as, if not greater than, that in *Paranthropus*. In these respects the female *A. prometheus* occiput corroborates the evidence of enlarged brain and erectness furnished by the young *A. africanus* (Dart, 1948a).

The adolescent male mandible of *A. prometheus* recently described (Dart, 1948b) and the craniofacial fragment (together with the two isolated teeth) described here furnish consistent and coherent evidence of this closer affiliation of *A. africanus*, *A. prometheus*, and *Paranthropus* with one another than of any of them with the more specialized and less progressive *Plesianthropus*.

News and Notes

American Association of Orthodontists

The 1950 meeting of the American Association of Orthodontists will be held at the Edgewater Beach Hotel, Chicago, Illinois, May 8, 9, 10, and 11.

American Board of Orthodontics

A 1950 meeting of the American Board of Orthodontics will be held at the Edgewater Beach Hotel, Chicago, Illinois, May 4, 5, 6, and 7. Orthodontists who may desire to be certified by the Board may obtain application blanks from the Secretary, Dr. Stephen C. Hopkins, 1726 Eye Street, N. W., Washington 6, D. C. Applications must be completed not later than March 1, 1950, for consideration at the Chicago meeting.

Prize Essay Contest, American Association of Orthodontists

Eligibility.—Any member of the American Association of Orthodontists; any person affiliated with a recognized institution in the field of dentistry as a teacher, researcher, undergraduate, or graduate student shall be eligible to enter the competition.

Character of Essay.—Each essay submitted must represent an original investigation and contain some new significant material of value to the art or science of orthodontics.

Prize.—A cash prize of \$500 is offered for the essay judged to be the winner. The committee, however, reserves the right to omit the award if in its judgment none of the entries is considered to be worthy. Honorable mention will be awarded to those authors taking second and third places. The first three papers will become the property of the American Association of Orthodontists and will be published. All other essays will be returned.

Specifications.—All essays must be typewritten on 8½ by 11 inch white paper, double-spaced, with 1 inch margins, and composed in good English. Three copies of each paper complete with illustrations, bibliography, tables, and charts must be submitted. The name and address of the author must not appear in the essay. For purposes of identification, the author's name together with a brief biographical sketch which sets forth his or her dental and/or orthodontic training, present activity, and status (practitioner, teacher, student, research worker) should be typed on a separate sheet of paper and enclosed in a sealed envelope. The envelope should carry the title of the essay.

Presentation.—The author of the winning essay will be invited to present it at the meeting of the American Association of Orthodontists to be held in Chicago, Illinois, May 8 to May 11, 1950.

Final Submission Date.—No essay will be considered for this competition unless received in triplicate by the chairman of the research committee on or before March 15, 1950.

ALLAN G. BRODIE, CHAIRMAN RESEARCH COMMITTEE,
AMERICAN ASSOCIATION OF ORTHODONTISTS,
30 NORTH MICHIGAN AVENUE, CHICAGO 2, ILLINOIS.

Southwestern Society of Orthodontists

The next annual meeting of the Southwestern Society of Orthodontists will be held at the Shamrock Hotel, Houston, Texas, Feb. 12-15, 1950.

Thomas P. Hinman Mid-Winter Clinic

The Thirty-seventh Annual Meeting of the Thomas P. Hinman Mid-Winter Clinic will be held at the Municipal Auditorium, Atlanta, Georgia, March 19, 20, 21, and 22, 1950. The general chairman is Dr. Sidney L. Davis, 932 Candler Building, Atlanta, Georgia, exhibit chairman, Dr. J. A. Broach, 1105 Doctors Building, Atlanta, Georgia.

Rocky Mountain Society of Orthodontists

The Rocky Mountain Society of Orthodontists just completed a very successful two-day session at which the following orthodontists were present:

Out-of-town orthodontists registered:

Dr. L. T. Walsh, Pueblo, Colorado.
Dr. K. R. Johnson, Colorado Springs, Colorado.
Dr. Geo. E. Ewan, Sheridan, Wyoming.
Dr. D. A. Closson, Kansas City, Missouri.
Dr. Wm. A. Elsasser, San Francisco, California.
Dr. E. H. Mullinax, Pueblo, Colorado.
Dr. R. E. Harshman, Scott Bluff, Nebraska.
Dr. W. K. Appel, Cheyenne, Wyoming.
Dr. R. R. Nolting, Albuquerque, New Mexico.

Denver orthodontists registered:

Dr. Kirman Taylor.
Dr. D. V. Benkendorf.
Dr. H. A. Banks.
Dr. G. H. Siersma.
Dr. E. T. Klein.
Dr. C. Benight.
Dr. E. S. Linderholm.
Dr. C. E. Burson.
Dr. W. R. Humphrey.
Dr. H. F. Hoffman.
Dr. O. H. Devitt.
Dr. J. L. Carman.
Dr. R. L. Gray.
Dr. T. A. Gardner.
Dr. A. B. Brusse.

The following officers were elected to serve our society for 1950:

Dr. Elmer S. Linderholm, 1558 Humboldt, President.
Dr. Ernest T. Klein, 632 Republic Building, Vice-President.
Dr. Curtis E. Burson, 1232 Republic Building, Secretary-Treasurer.

Dr. Leonard Walsh was elected to serve as director on the National Board of Directors for 1950 with Dr. Oliver H. Devitt as alternate.

Dr. Henry F. Hoffman was re-elected to serve in 1950 as sectional editor from our society to the AMERICAN JOURNAL OF ORTHODONTICS.

Dr. H. F. Hoffman and Dr. W. R. Humphrey were elected to serve our society in 1950 on the board of directors.

Southern Society of Orthodontists

The Silver Anniversary Meeting of the Southern Society of Orthodontists was held at the Roosevelt Hotel, New Orleans, Louisiana, Oct. 30, 31, and Nov. 1, 1949.

Sunday, October 30, was given over to entertainment. The complete facilities of the Metairie Country Club were made available to those who wished to play golf, and a quick lunch was available at the Club. This was enjoyed a great deal by those members who tested this beautiful course.

There was a cocktail party in Room E of the Roosevelt Hotel at 7:00 P.M. This was followed by a superb New Orleans dinner in the Gold Room. Both of these parties were well attended and thoroughly enjoyed by the members of the association, as well as by their wives and guests.

On Monday, October 31, registration began at 8:30 A.M. on the mezzanine of the Roosevelt Hotel. The ladies were conducted on an interesting tour of New Orleans terminating with a delightful luncheon at La Louisiana.

At 10:00 A.M. Dr. S. D. Gore, President, called the meeting to order and the invocation was given by Rev. William D. O'Leary, S. J., Acting Dean of Loyola Dental School. Mayor de Lesseps S. Morrison personally welcomed the society to the city of New Orleans, and the response to his address was given by Dr. Daniel T. Carr of Durham, North Carolina. Recognition was given to visitors, followed by the reading of the minutes and report of the Secretary-Treasurer, Dr. Frank P. Bowyer of Knoxville, Tennessee, who reported a one hundred per cent paid-up membership. This report was enthusiastically received. Dr. S. D. Gore, New Orleans, Louisiana, then gave his president's address which was a splendid address and well received.

To conclude the opening session Dr. W. M. Krogman gave a splendid paper on "Dynamic Growth or Static Technique."

The afternoon session was called to order at 2:00 P.M. Dr. A. S. Bumgardner, Charlotte, North Carolina, gave a very fine paper titled, "The Dentist and the Orthodontist; A Study in Correlation."

Next on the program the following table clinics were given:

Twenty Consecutively Treated Cases Using the Tweed Philosophy of Treatment. Dr. Marvin C. Goldstein, Atlanta, Georgia.

The Use of Occipital Anchorage in Orthodontics. Dr. Thad Morrison, Jr., Atlanta, Georgia.

Drawing Better Twin Wires Into the End Section Tubes; Making Better Work Models Quicker. Dr. W. A. Buhner, Daytona Beach, Florida.

Hawley Retainers. Dr. Brooks Juett, Lexington, Kentucky.

Correction of Extreme Mesioclusion by Surgical and Orthodontic Procedures. Dr. Thomas D. Pryse, Knoxville, Tennessee.

Centric Occlusion-Diagnosis-Retention. Dr. Burke Coomer, Louisville, Kentucky.

Cases Treated Showing Models, Before and After, With Actual Appliances and Photographs. Dr. Oren A. Oliver and Dr. W. H. Oliver, Nashville, Tennessee.

Take a Look at This and That. Dr. M. Duke Edwards, Montgomery, Alabama.

Additional clinics were given by Dr. Doyle J. Smith, Memphis, Tennessee, Dr. Frank P. Bowyer, Knoxville, Tennessee, Dr. Olin W. Owen, Charlotte, North Carolina, Dr. Robert E. Allen, Jacksonville, Florida, and Dr. Neil J. Leonard, Memphis, Tennessee.

On Tuesday, November 1, at 9:30 A.M., the meeting was called to order by Dr. S. D. Gore, President. A report of the Board of Directors, report on the president's address, and committee reports were given.

Next on the program was the election of officers, and the following men were elected to serve:

President, Dr. E. C. Lunsford, Miami, Florida.

President-Elect, Dr. W. H. Lewis, Petersburg, Virginia.

Vice-President, Dr. Charles Harrison, St. Petersburg, Florida.

Secretary-Treasurer, Dr. Frank P. Bowyer, Knoxville, Tennessee.

Junior Member of Board, Dr. Leigh C. Fairbank, Washington, D. C.

The following committee elections were also made:

Dr. Paul Hoffman, Washington, D. C., to the Education Committee.

Dr. W. J. Turbyfill, Asheville, North Carolina, to the Research Committee.

Dr. W. H. Oliver, Nashville, Tennessee, to the Committee on Constitution and By-laws.

Dr. Orville O. Van Deusen, Winchester, Virginia, to the Public Relations Committee.

The following active and associate members were elected:

Active:

Dr. Hugh M. Hunsucker, Greensboro, North Carolina.

Dr. Eva C. Nissen, Winston-Salem, North Carolina.

Dr. William Parker, Knoxville, Tennessee.

Dr. Richard Kent Steiner, Huntington, West Virginia.

Dr. Dennis P. Quittner, Miami, Florida.

Associate:

Dr. Guy W. Toph, Tampa, Florida.

Dr. Richard A. Walle, New Orleans, Louisiana.

Following these elections Dr. Andrew F. Jackson, Philadelphia, Pennsylvania, read a very fine paper titled, "*Orthodontics and Orthodontists.*" This paper was well received by all who were present. On completion of Dr. Jackson's paper two case reports were given by Dr. Brooks Juett of Lexington, Kentucky: (1) "A Complete Treatment Using Only a Hawley Removable Appliance," (2) "A Treatment of a Class III Case Using the Johnson Twin Wire Technique."

The morning session was concluded with the presentation of a splendid paper by Dr. Arthur C. Totten, New York City, "*Whither Ye,*" which was well received.

The afternoon session was opened with the presentation of the second part of Dr. Totten's paper and then case reports by Dr. Andrew F. Jackson. Dr. Robert Litowitz, Miami Beach, Florida, gave a case report titled, "*Treatment of a Cleft Palate Case.*"

Dr. W. J. Turbyfill of Asheville, North Carolina, then presented a technical motion picture in color showing chair technique and various methods of ligating an edgewise appliance.

The final scientific presentation was by Dr. Brooks Bell, Dallas, Texas, who gave a very fine paper on "*Office Routine.*"

It was generally felt by the membership that the scientific papers were of the highest caliber, and everyone is looking forward to reading them when they are published in our JOURNAL.

At 4:00 P.M. there was a business session followed by the installation of officers. The past president's key was presented to Dr. S. D. Gore by Dr. O. A. Oliver.

The registration for this meeting was one hundred thirty-two, and approximately sixty wives of members were present. New Orleans, with its interesting historical background and wonderful hospitality, was enjoyed by all, and it was agreed that this was one of the finest meetings in the history of the Southern Society of Orthodontists.

The next meeting will be held in Miami, Florida, but no definite date has been set.

OREN A. OLIVER.

Philadelphia Society of Orthodontists

A meeting of the Philadelphia Society of Orthodontists was held on Monday, Nov. 14, 1949.

Dr. Arthur V. Greenstein of New York City, assisted by Dr. William R. Joule of Newark, New Jersey, and Dr. Brainerd F. Swain of Morristown, New Jersey, gave a clinic on "*The Role of Extraction in Orthodontic Therapy.*"

Following the dinner Dr. Wilton M. Krogman, of the University of Pennsylvania, made some pertinent remarks relative to the subject matter.

At a short business meeting held by the society the officers elected for the year 1950 are:

Dr. Andrew F. Jackson, President.

Dr. John M. Jackson, Secretary-Treasurer.

JOHN M. JACKSON, Secretary-Treasurer.

Tufts Graduate Orthodontic Study Club

Tufts Graduate Orthodontic Study Club held its first annual meeting Nov. 26 and 27, 1949, at the Harvard Club in Boston, Mass. It consisted of a seminar on the growth and development of the human face with discussions in related sciences and the application in clinical orthodontics.

The officers are:

Herbert I. Margolis, Director.

Henry Kaplan, Chairman.

Michael B. Collito, Vice-Chairman.

Norman M. Cetlin, Secretary-Treasurer.

The program presented was as follows:

Case Reports. Members of the Tufts Graduate Orthodontic Study Club.

The Margolis Cephalometric Equipment; Design and Mechanics of Operation. Dr. Michael B. Collito, Teaching Fellow, Graduate of Orthodontics, Tufts College Dental School.

Discussion. Dr. Charles H. Tweed, Director, Tweed Foundation for Orthodontic Research.

Dr. Earnest A. Hooton, *Chairman*

General Growth and Development. Dr. Harold C. Stuart, Professor of Maternal and Child Health, Harvard School of Public Health.

Application of Genetics to Growth and Development of the Human Face. Dr. Herman B. Chase, Associate Professor of Biology, Brown University.

Neurologic and Embryologic Principles as Applied to the Development of the Face. Dr. Benjamin Spector, Professor of Anatomy, Tufts College Medical School.

Dr. Herbert I. Margolis, *Chairman*

Dr. Earnest A. Hooton, *Guest of Honor*

Some Evolutionary Factors of Normal Dental Occlusion in Vertebrates. Dr. William K. Gregory, Da Costa, Professor Emeritus of Vertebrate, Palaeontology, Columbia University.

Clinical Application of Evolutionary Trends. Dr. Charles H. Tweed.

Dr. Cyril D. Marshall-Day, *Chairman*, Dean, Tufts College Dental School

The Effect of Pregnancy and Labor on the Contours of the face. Dr. Duncan E. Reid, Professor of Obstetrics, Harvard Medical School.

Interests of the Pediatrician in Orthodontics. Dr. Warren R. Sisson, President, American Academy of Pediatrics.

A Progressive Study of Various Factors Influencing the Growth and Development of Sixty Children Under Orthodontic Treatment. Mrs. Tomi Hibbett, Chief Nutritionist, Forsyth Dental Infirmary.

Endocrine Factors in Growth and Development. Dr. Samuel Gargill, Associate in Medicine, Harvard Medical School.

Facial Aesthetics. Mr. William Boyhan, Instructor, School of the Museum of Fine Arts.

Cephalometric Appraisal of the Face in Clinical Orthodontics. Dr. Herbert I. Margolis, Professor of Graduate Orthodontics, Tufts College Dental School.

Northwestern University Orthodontic Seminar

The Northwestern University Orthodontic Seminar was held Nov. 28, 29, and 30, 1949. The program follows:

Monday, November 28, Thorne Hall

Biology of the Masticating Mechanism. Harry Sicher, Professor of Histology and Anatomy, Loyola University Dental School, and Guest Professor, Department of Orthodontia, Northwestern University Dental School.

Dr. Sicher will discuss the biology of bone, eruption of the teeth, growth of the facial skeleton, and the anatomy and physiology of the temporomandibular articulation.

An Interpretation of Malocclusion of the Teeth From the Viewpoint of Function of the Masticating Mechanism. John R. Thompson.

A Consideration of Dynamic Occlusion of the Teeth.

Charles H. M. Williams, Associate Professor of Periodontology, University of Toronto Dental School, Toronto, Canada.

Dr. Williams will discuss in detail the influences of the dynamic relations of the teeth on the supporting structures, an analysis of the mechanics, and on this basis will present a process for occlusal correction by grinding or, as he prefers, artificial wear.

Engineering the Universal Appliance. Spencer Atkinson, University of Southern California, Pasadena, California.

The first portion of the presentation will be devoted to the problem of malocclusion and the second portion, the practical means of solving the problem. The material will deal with principles that are applicable regardless of type of appliance employed.

The Nature of Facial Prognathism and Its Application to the Analysis of Malocclusion. Arne Bjork, Vasteras, Sweden.

Dr. Bjork will report on his cephalometric studies of the Swedish population and primitive tribes in Africa. The application of these studies to a better understanding of the character and etiology of malocclusion will be made.

Systematic Organization of Orthodontic Treatment; Objectives and Procedures. Emery J. Fraser, Department of Orthodontics, University of Washington Dental School, Seattle, Washington.

Orthodontic Treatment with the Anderson System of Appliances. Dr. Arne Bjork.

Dr. Bjork is a practicing orthodontist and he will discuss the methods of treatment that he employs.

1. Results of Treatment Procedure Following a Basic Routine. Emery J. Fraser.

2. Presentation of Cases Long Free From Retention. (Illustrated by a motion picture.) Spencer Atkinson.

3. Analysis of Malocclusion of the Teeth. John R. Thompson and T. M. Graber.

Emphasis will be placed on the information available from cephalometric radiographs.

4. Edgewise Arch Mechanics Demonstrated on Typodents and Patients. James C. Toothaker.

5. Stainless Steel Appliance Construction. Frank Krivanek.

6. Construction of the Anderson Appliance. Arne Bjork.

For those who desired to stay for a fourth day the Northwestern University Cleft Palate Institute demonstrated its procedure in analysis and treatment of the cleft palate patient.

American Dental Association

America's sweet tooth is one of the main reasons for this nation's enormous percentage of decayed teeth, a nationally known dental educator said today.

Dr. John C. Brauer, Dean of the University of Southern California's College of Dentistry, reported that although the cause and prevention of tooth decay are controversial, there is one point of general agreement—excessive sugar consumption is a prime factor.

Dr. Brauer pointed out that what constitutes "excessive sugar consumption" varies among individuals. He explained:

"While the reduction in refined sugars and other carbohydrates is recommended strongly, and it may be concluded that dental caries virtually can be eliminated by this procedure, one cannot dismiss the other contributing factors which have been observed in a small percentage of the population.

"It is well known that some children and adults can consume much larger quantities of refined sugars and carbohydrates than others without experiencing dental decay."

Dr. Brauer's comments on the role of sugar in tooth decay were part of a general review of the dental caries problem in the current issue of the *Journal of the American Dental Association*.

The California educator reported that he had found that diabetic children placed on low sugar diets had virtually no dental decay.

He said similar diets could be followed by most children to great advantage, but added, "Unfortunately, few children are required or are willing to follow such a disciplined dietary regimen even though large dividends would accrue."

Dr. Brauer pointed out that in addition to a low sugar diet, effective aids in reducing the incidence of dental decay include proper mastication of food and the regular use of cleansing agents such as toothbrushes and dentifrices.

New President of American Dental Association

Dr. Philip E. Adams, orthodontist (left), of Boston, the new president of the American Dental Association, is shown below with Dr. Harold W. Oppice, of Chicago, new president-elect, at the close of the A.D.A.'s ninetieth annual session at San Francisco in October. Dr. Adams succeeded Dr. Clyde E. Minges, of Rocky Mount, North Carolina. Dr. Oppice was unanimously elected to the position of president-elect by the House of Delegates.



Dr. Adams has been active in the affairs of organized dentistry since his graduation from Tufts Dental School in 1918. In 1927 and 1928 he served as secretary of the Metropolitan (Boston) District Dental Society and for twenty years was the secretary of the Massachusetts Dental Society. Dr. Adams also served eleven years as a member of the A.D.A. Board of Trustees and two years ago held the office of first vice-president. He was unanimously named president-elect at the eighty-ninth A.D.A. meeting in Chicago in the fall of 1948.

Dr. Oppice, who will become president of the Association in November, 1950, at the close of the ninety-first annual session at Atlantic City, has been engaged in the private practice of dentistry in Chicago for the past twenty-nine years. He formerly was president of the Chicago Dental Society and editor of the *Illinois Dental Journal*. For several years he has been a member of the faculty of the Chicago College of Dental Surgery, Dental School of Loyola University, where he now holds the position of professor of crown and fixed bridge prosthesis. Dr. Oppice resigned as the A.D.A. trustee from the eighth (Illinois) district, a post he has held for five years, to assume his new office.

Medical Care Program

Playing the role of a consumer of medical care, Dr. Edwin F. Daily, Director of Health Services in the Children's Bureau, Federal Security Agency, today described the principles that he thinks should apply in any type of public or private medical care program that attempts to meet consumers' needs. He was addressing the ninth annual round table conference of the American Public Welfare Association meeting in Washington.

"The quality of medical care is primarily of importance to the recipients of services, the patients," Dr. Daily remarked, "and it's their wishes I am trying to express."

Dr. Daily's ideal plan would "provide all professional and auxiliary services, hospital and convalescent home care that I might need and that could be made available. I wouldn't want anything to do with a pan that provides only fragments of the services I might need."

As to the persons operating a medical care plan, Dr. Daily listed 11 points:

1. I would want the administrative staff and all professional personnel of a medical care plan serving my family to be concerned always with the promotion of positive health, the prevention of illness and disability, as well as the treatment of disease and rehabilitation.
2. I would wish to have my medical care plan contract to provide or pay for services rendered only by professional personnel who are recognized as competent in their respective fields. I would hope that my medical care plan would discourage me, if possible, from seeking professional help from individuals who are not competent to provide it.
3. I would wish that those persons in my plan, who set standards for professional personnel, would consider it important that the physicians be as much concerned with environmental and social causes of illness as with the infectious and other causes.
4. I would like to have my medical care plan provide physicians and other personnel who are as interested in the long-time treatment of my child with cerebral palsy as they are interested in the dramatic response I made to treatment with a new antibiotic.
5. I would wish the physicians to be selected from among those who would treat me at all times as an individual, giving me as much personal attention as they would wish for a member of their own family. I would not like to be "Case No. 329," and be given a brush-off as one of 50 patients being seen that morning.
6. I would want to see my physician in an attractive office or clinic, where there are comfortable chairs, because I dislike basements of courthouses and hard benches.
7. I would like my office visits to be by appointment, for I dislike waiting for hours on a hard bench or in a comfortable chair.
8. I would like to be able to change my physician if I became dissatisfied with him or if he thought I would do better under the care of another physician.
9. I would wish my medical care plan to afford its professional personnel, wherever feasible, opportunities for working in groups—with easily accessible diagnostic equipment they may need—in order that they may easily consult with each other, and in order that I would not need to go from one place to another for a series of consultations or laboratory tests.
10. I would want to know how, when, and where I could get medical care in an emergency, whether such care is required at home, office, or hospital.
11. And, since what is good medical care today may not be good enough a few years from now, I would wish to have the personnel in my medical care plan have regular opportunities for postgraduate training and to be continually considering ways and means of bringing to us—the patients—the most recently acquired knowledge in this great and complex field of human endeavor.

Dr. Daily also recommended that hospital care be provided only in institutions which meet national standards of performance.

In another 8 points, Dr. Daily describes the administrative machinery that should operate in a medical care program geared to consumer needs:

1. I would not want to be told at any time that I was not eligible for care because of the place of my legal residence, or because my skin was not white.
2. I would not wish to have red tape, or tape of any other color, delay my obtaining any services I need under my medical care plan.
3. I would want my medical care plan to cover all costs of all services provided, and I would not want the physicians or hospitals to ask me for more money because my case was unusual, or because they didn't think the plan paid them enough.
4. I would want the method of payment to physicians and hospitals to be of a type that would prevent the possibility of financial consideration influencing the clinical decisions of the physicians or hospitals.
5. I would want the administrator of the plan and his staff to be fully competent to develop the best medical care plan possible, and to improve it year by year on the basis of experience. I would want this professional staff to be selected on the basis of merit alone, to serve only the best interests of the community and not the selfish interests of any special group.
6. I would want a group representing those of us served by the plan, and those providing services, to be given ample opportunity, at regular intervals, to confer with the administrator and his staff and to express our viewpoints fully.
7. I would like to have an impartial appeal board established to hear my complaints about the plan, or complaints of the professional staff providing services.
8. And last, I would like to have the amount of money paid the administrator and his staff, and the professional personnel, high enough to attract and hold, in rural or urban areas, the best people available, and to have working conditions and other factors conducive to their deriving satisfaction from their work. I would not want bargain-counter medical care.

One way of assuring complete and competent services, Dr. Daily stated, is the opportunity for representatives of the consumers and of the providers to meet at regular intervals to express their viewpoints fully.

Notes of Interest

Dr. K. I. Andreve announces the opening of offices for the exclusive practice of orthodontics at 112 Wolfe Medical Building, 153 Bishop Street, Greensboro, North Carolina, telephone 4-1750.

Michael B. Collito, D.D.S., announces the opening of his offices at 353 Roseville Avenue, Newark, New Jersey, practice limited to orthodontics.

Dr. H. C. Pollock announces the association of his son, H. Carlyle Pollock, Jr., in the practice of orthodontics at 8015 Maryland Avenue, St. Louis 5, Missouri.

Ivan L. Staley, D.D.S., announces change of location from 802 Metropolitan Building, St. Louis, Missouri, to 956 Citizens Building, Decatur, Illinois.

Dr. A. P. Westfall and Dr. Elwood L. Mooney announce the removal of their offices to 1414 Medical Arts Building, Houston, Texas, practice limited to orthodontics.

Claude R. Wood, D.D.S., announces the opening of temporary offices for the exclusive practice of orthodontics at 1640 West Cumberland Avenue, Knoxville, Tennessee.

OFFICERS OF ORTHODONTIC SOCIETIES

The AMERICAN JOURNAL OF ORTHODONTICS is the official publication of the American Association of Orthodontists and the following component societies. The editorial board of the AMERICAN JOURNAL OF ORTHODONTICS is composed of a representative of each one of the component societies of the American Association of Orthodontists.

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Northeastern Society of Orthodontists

President, Robert H. W. Strang - - - - - 886 Main St., Bridgeport, Conn.
Secretary-Treasurer, Oscar Jacobson - - - - - 35 W. 81st St., New York, N. Y.

Pacific Coast Society of Orthodontists

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Rocky Mountain Society of Orthodontists

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Southern Society of Orthodontists

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Southwestern Society of Orthodontists

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American Board of Orthodontics

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Treasurer, Reuben E. Olson - - - - - 712 Bitting Bldg., Wichita, Kan.
Raymond L. Webster - - - - - 133 Waterman St., Providence, R. I.
Leuman M. Waugh - - - - - 931 Fifth Ave., New York, N. Y.
C. Edward Martinek - - - - - Fisher Bldg., Detroit, Mich.

A List of the Orthodontic Societies of the World and Their Principal Officers***Chicago Association of Orthodontists**

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President-Elect, Howard J. Buchner - - - - - 1011 Lake St., Oak Park, Ill.
Secretary-Treasurer, Beulah G. Nelson - - - - - 715 Lake St., Oak Park, Ill.

Harvard Society of Orthodontists

President, Sidney P. Stone - - - - - 21 Columbia Road, Dorchester, Mass.
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Secretary, Bernard C. Rogell - - - - - 6 Pleasant St., Malden, Mass.
Treasurer, Clifford G. Hunt - - - - - 35 Waltham St., Lexington, Mass.

New York Society for the Study of Orthodontics

President, Abbey E. Weinstein - - - - - 25 Central Park W., New York, N. Y.
Vice-President, Lawrence Goodman - - - - - 135-09 109th Ave., Richmond Hill, N. Y.
Secretary, Jack Perlow - - - - - 1777 Ocean Parkway, Brooklyn, N. Y.
Treasurer, Emanuel D. Greenberg - - - - - 1280 Lexington Ave., New York, N. Y.

New York University Orthodontic Society

President, Robert J. DiTolla - - - - - 5 E. 53rd St., New York, N. Y.
Secretary-Treasurer, Benjamin Ackerman - - - - - 7616 Bay Parkway, Brooklyn, N. Y.

Philadelphia Society of Orthodontists

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Secretary-Treasurer, John M. Jackson - - - - - Medical Arts Bldg., Philadelphia, Pa.

St. Louis Society of Orthodontists

President, Leo M. Shanley - - - - - 7800 Maryland Ave., Clayton 5, Mo.
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Secretary-Treasurer, Everett W. Bedell - - - - - 1504 S. Grand Blvd., St. Louis 4, Mo.

Washington-Baltimore Society of Orthodontists

President, William D. Curtis - - - - - 1726 Eye St., N.W., Washington 6, D. C.
Vice-President, William Kress - - - - - Medical Arts Bldg., Baltimore 1, Md.
Secretary-Treasurer, Carlotta A. Hawley - - - - - 915 19th St., N.W., Washington 6, D.C.

Foreign Societies**British Society for the Study of Orthodontics**

President, M. W. Rushton - - - - - Guy's Hospital, S. E. 1, London
Secretary, K. E. Pringle - - - - - 12 Manchester Square, W.1, London
Treasurer, Harold Chapman - - - - - 6 Upper Wimpole St., W.1, London

Sociedad Argentina de Ortodoncia

President, Miguel A. Finocchietti - - - - - Serrano 638, Buenos Aires
Secretary, Samuel Pisarenko - - - - - Esmeralda 860, Buenos Aires
Treasurer, Antonio J. Guardo - - - - - Pueyrredon, 2338, Buenos Aires

*In the January issue of the AMERICAN JOURNAL OF ORTHODONTICS is published each year a list of the orthodontic societies of the world of which the JOURNAL has any record, along with the names and addresses of their principal officers.

The JOURNAL keeps a file for each of these societies and publishes the names that appear in that file as of the date of going to press.

Sociedad Brasileira de Ortodoncia

President, Joaquim Cavalcanti - - - - - Praca G. Vargas 2, S. 422, Rio de Janeiro
Vice-President, Kant Duarte - - - - - Rua Manuel de Carvalho, 16-9°, S. 91, Rio de Janeiro
Secretary, Virgilio Moozen - - - - - de Oliverira, Av. Rio Branco 311-6°, S. 613, Rio de Janeiro

Sociedad de Ortodoncia de Chile

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Vice-President, Arturo Toriello - - - - - Londres No. 63, Santiago
Secretary, Juan Colin - - - - - San Martin No. 133, Santiago
Treasurer, Pedro Gandulfo - - - - - Londres No. 63, Santiago

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President, José Mayoral - - - - - Carrera 9, No. 21-68, Bogota
Vice-President, Obdulio Mendez - - - - - Calle 12, No. 15-06, Bogota
Secretary-Treasurer, Marco Novoa - - - - - Calle 11, No. 17-30, Bogota

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President, Carlos Coro - - - - - Virtudes 618, Habana
Vice-President, Dario Gandarias - - - - - Calle 25, No. 954, Vedado, Habana
Secretary-Treasurer, Dra. Margarita Amézaga - - - - - Virtudes 618, Habana

Guatemalan Association of Orthodontics and Relative Sciences

Secretary, Enrique Estrada H. - - - - - Apartado de Correos No. 110, Guatemala

Asociación Mexicana de Ortodoncia

President, Samuel Fastlicht - - - - - Madero 40, Mexico City
Secretary, Guillermo S. Gamboa - - - - - Madero 34, Mexico City
Treasurer, Wilfrido Arias - - - - -

Sociedad Peruana de Ortodoncia

President, Augusto Taiman - - - - - Arzobispo 284, Lima
Vice-President, Ricardo Salazar - - - - - Edificio Olaya 38, Lima
Secretary, Carlos Elbers - - - - - Arzobispo 284, Lima
Treasurer, Gerardo Calderon - - - - -

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Vice-President, German Moreno - - - - - Phillips No. 56, Santiago, Chile
Secretary, Eduardo Manns - - - - - Huerfanos No. 979, Santiago, Chile
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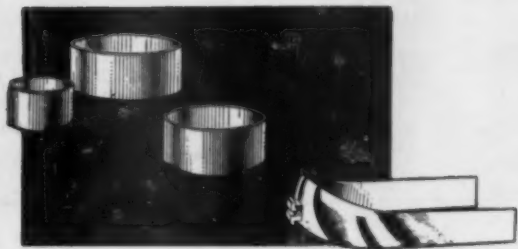
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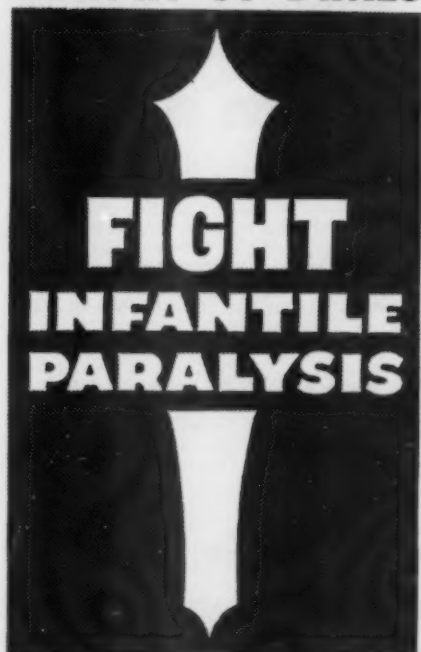
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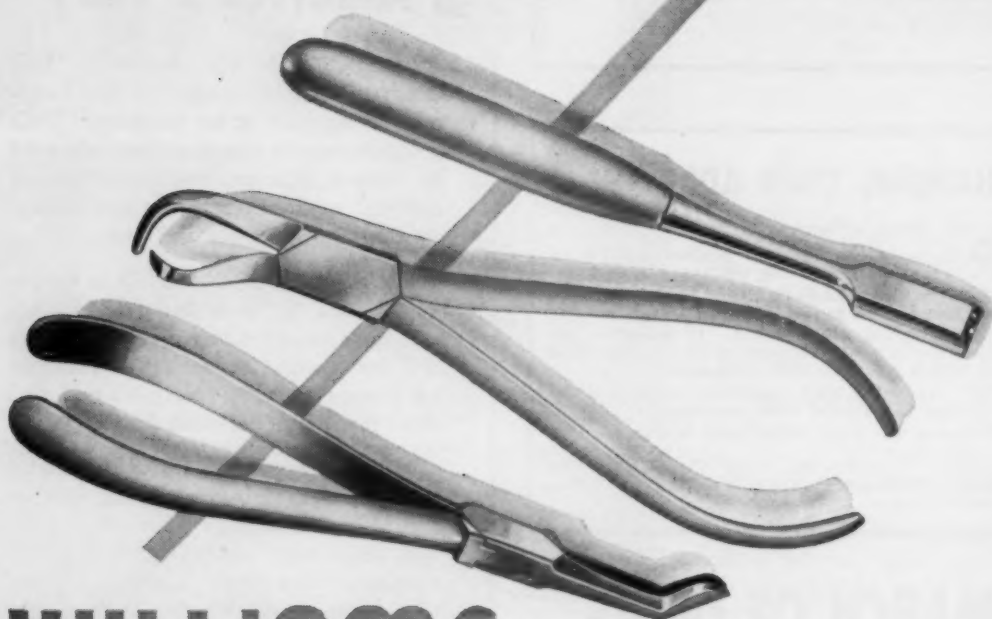
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